KERN & Sohn GmbH
Ziegelei 1
D-72336 Balingen-Frommern
E-Mail: info@kern-sohn.com
Tel: 0049-[0]7433- 9933-0
Fax: 0049-[0]7433-9933-149
Internet: www.kern-sohn.com

KERN MRS 120-3

Version 1.1 02/2008

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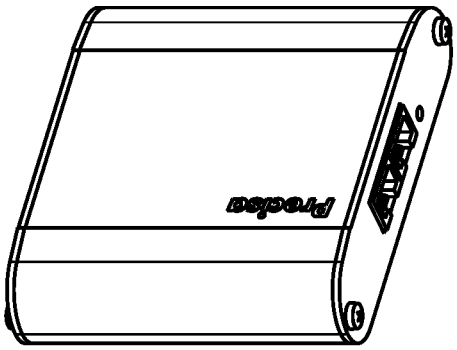
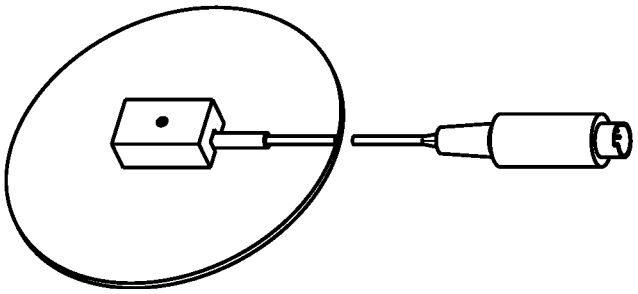
1. Accessories

1.1 Temperature calibration set



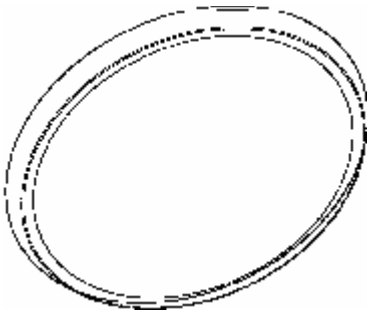


Key-No.	Part-No.	Description
1	MRS-A01	Temperature calibration set

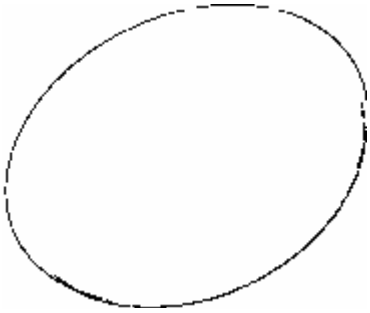
IMPORTANT: For repair of the temperature calibration set no spare parts are supplied. The faulty temperature calibration set must be returned for repair to KERN & Sohn GmbH.

1.2 Consumables

1.



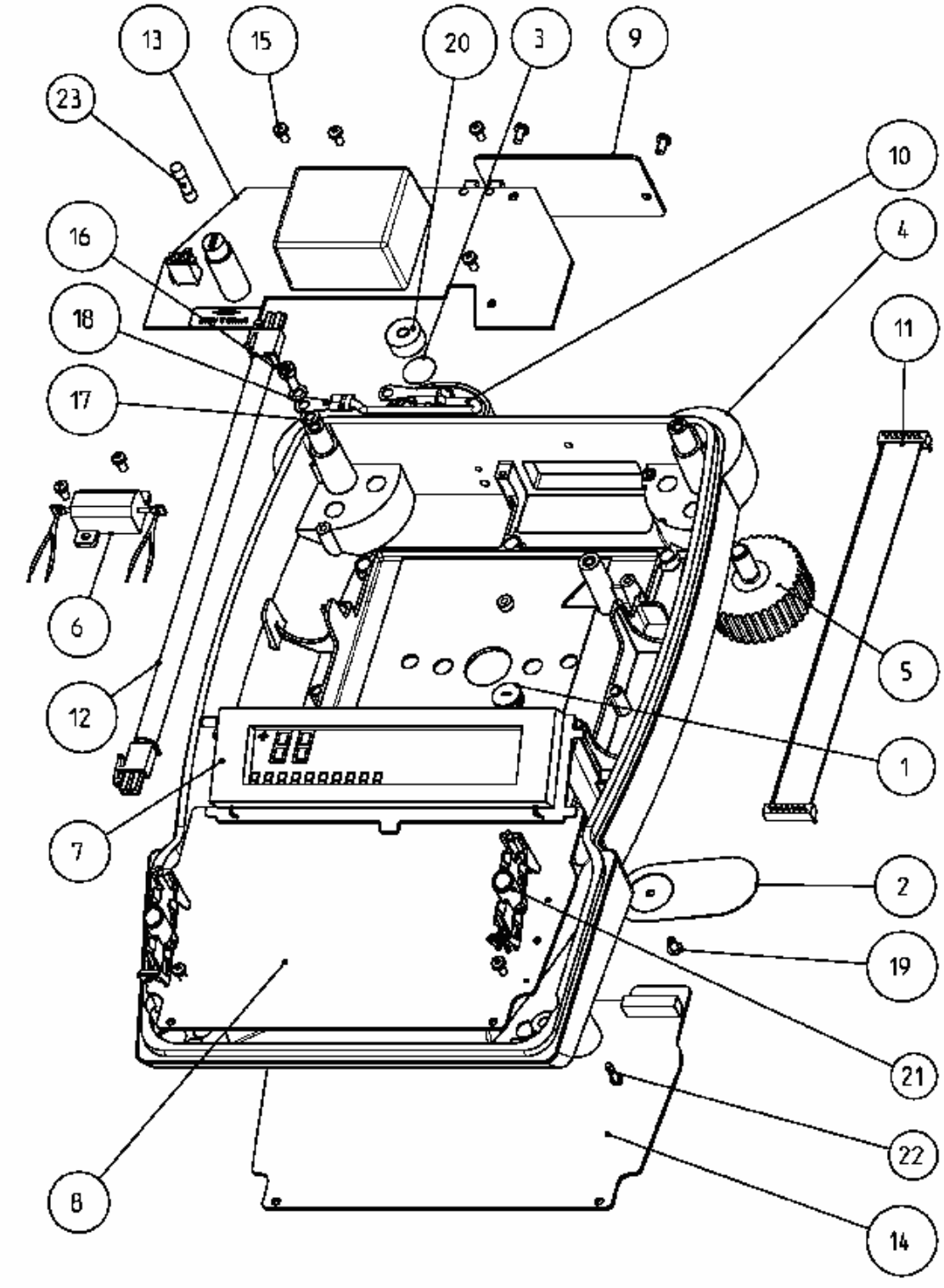
2.



Key-No.	Part-No.	Description
1	MLB-A01	Aluminium pans (80 pieces in a box)
2	RH-A02	Glass fibre papers (100 pieces in a box)

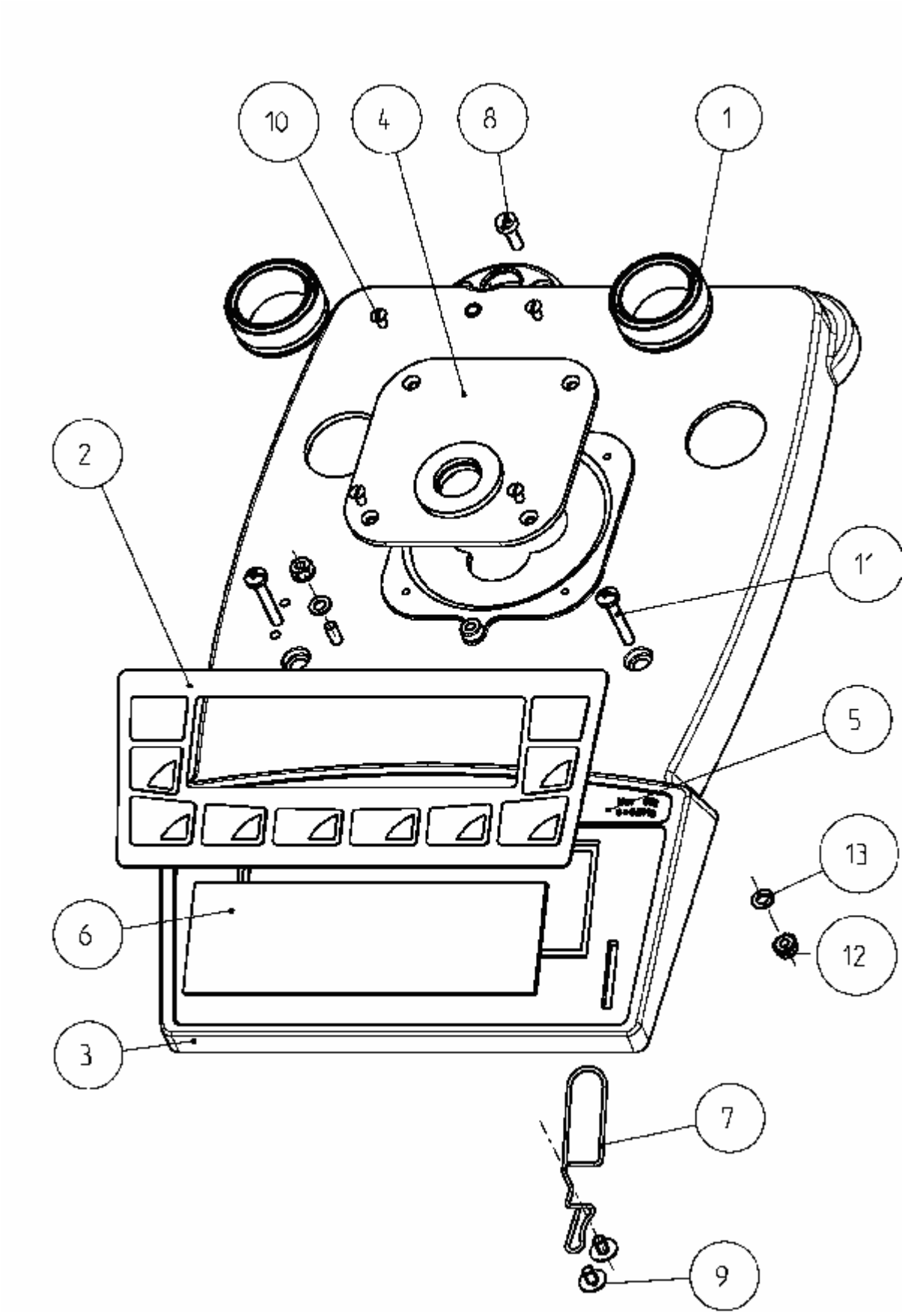
2. Mechanics

2.1 Bottom of balance



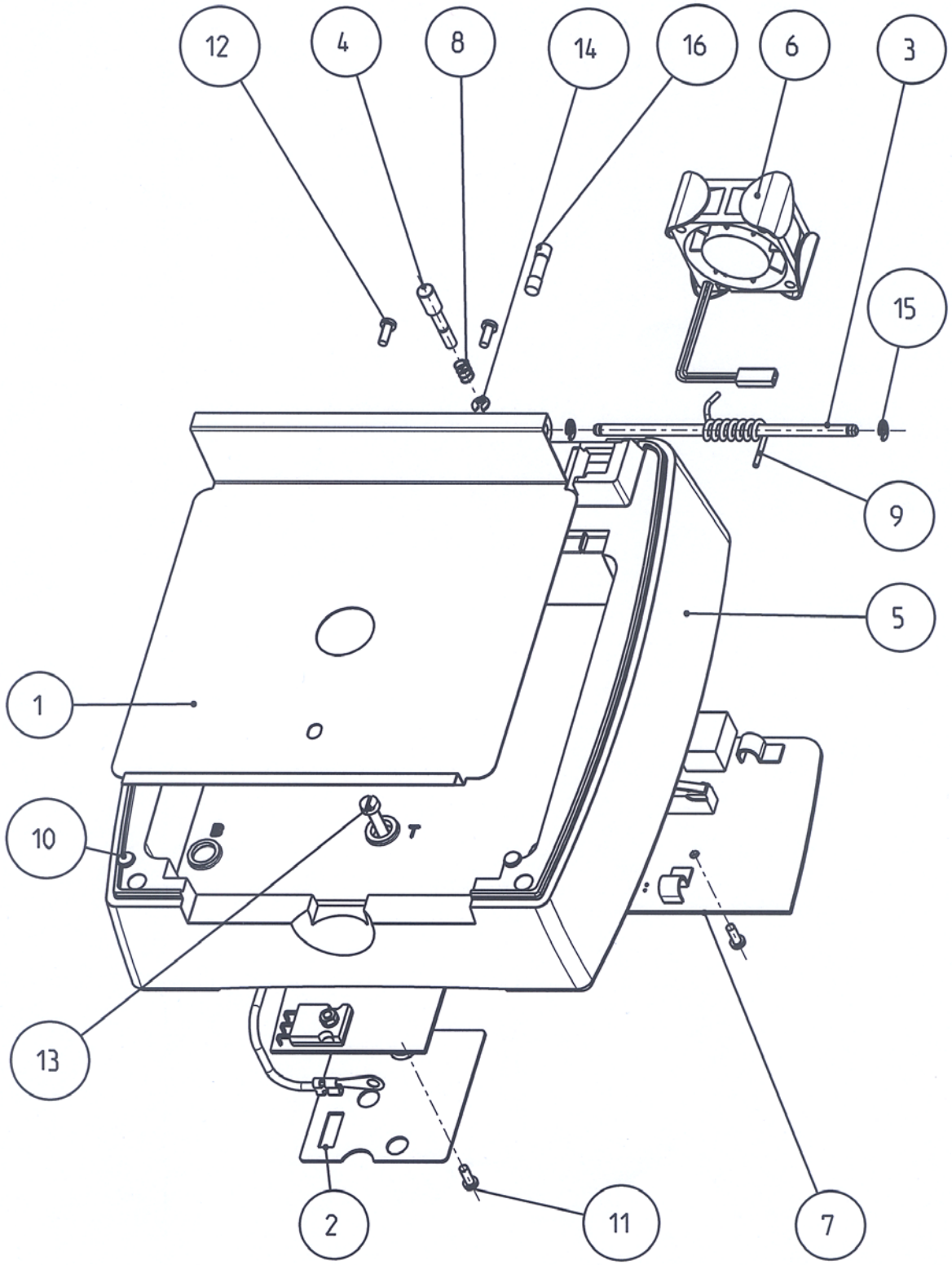
Key-No.	Part-No.	Description
1	240-4048	Screw
2	320-2010	Cover
3	320-4056	Adhesive tape for leveling unit
4	320-7005	Bottom of housing
5	320-7015	Leveling screw
6	320-7032-003	Measuring resistor
7	320-7204-010	Display board MRS 120-3
8	320-7215-020	Main board MRS 120-3
9	330-2017	Cover
10	330-7015	Ground wire short
11	330-7020	Signal cable
12	330-7021	Connecting cable main
13	330-7201-010	Power supply board
15	PN 1100-023	Screw M3x6
16	PN 1100-171	Screw M4x10
17	PN 1500-010	Lock washer M4
18	PN 1500-035	Lock washer M4
19	PN 1700-034	Rivscrew
20	PN 3730-001	Leveling unit
21	320-4049	Display holder
22	PN 1100-240	Screw KA25x10
23	PN 3612-006	Fuse 63mA T 230V
23	PN 3612-012	Fuse 125mA T 115V

2.2 Top of balance



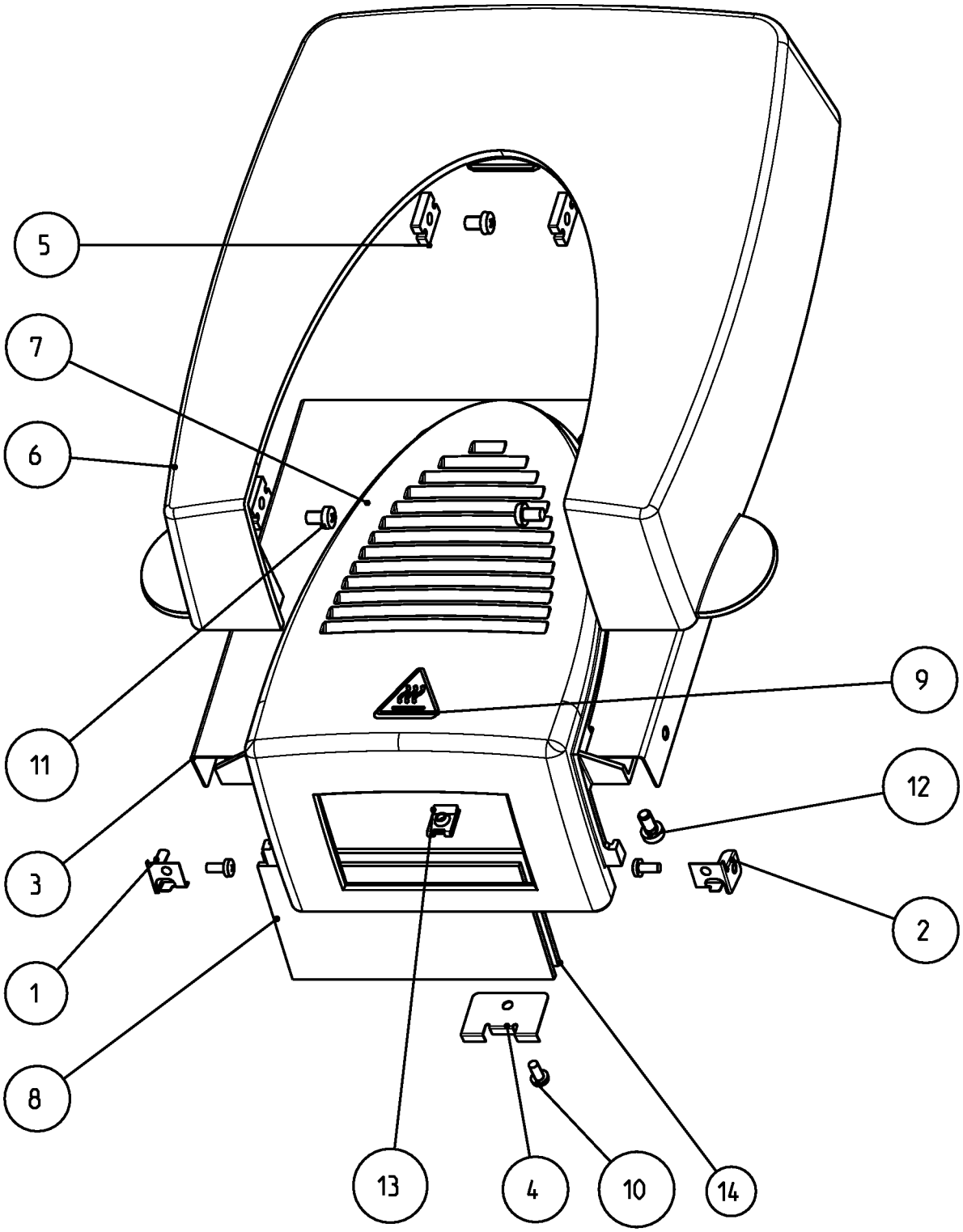
Key-No.	Part-No.	Description
1	330-4012	Rubber bushing
2	330-4015	Membrane switches
3	330-7000	Top of housing
4	330-7008	Cover plate
5	330-7022	Identification Label
6	350-4098	Display glass
7	F4-184	Guidance spring
8	PN 1100-176	Screw M4x12
9	PN 1100-211	Screw M4x6
10	PN 1100-216	Screw M3x6
11	PN 1100-227	Screw M4x25
12	PN 1300-051	Combo nut M4
13	PN 1500-010	Lock washer M4

2.3 Base



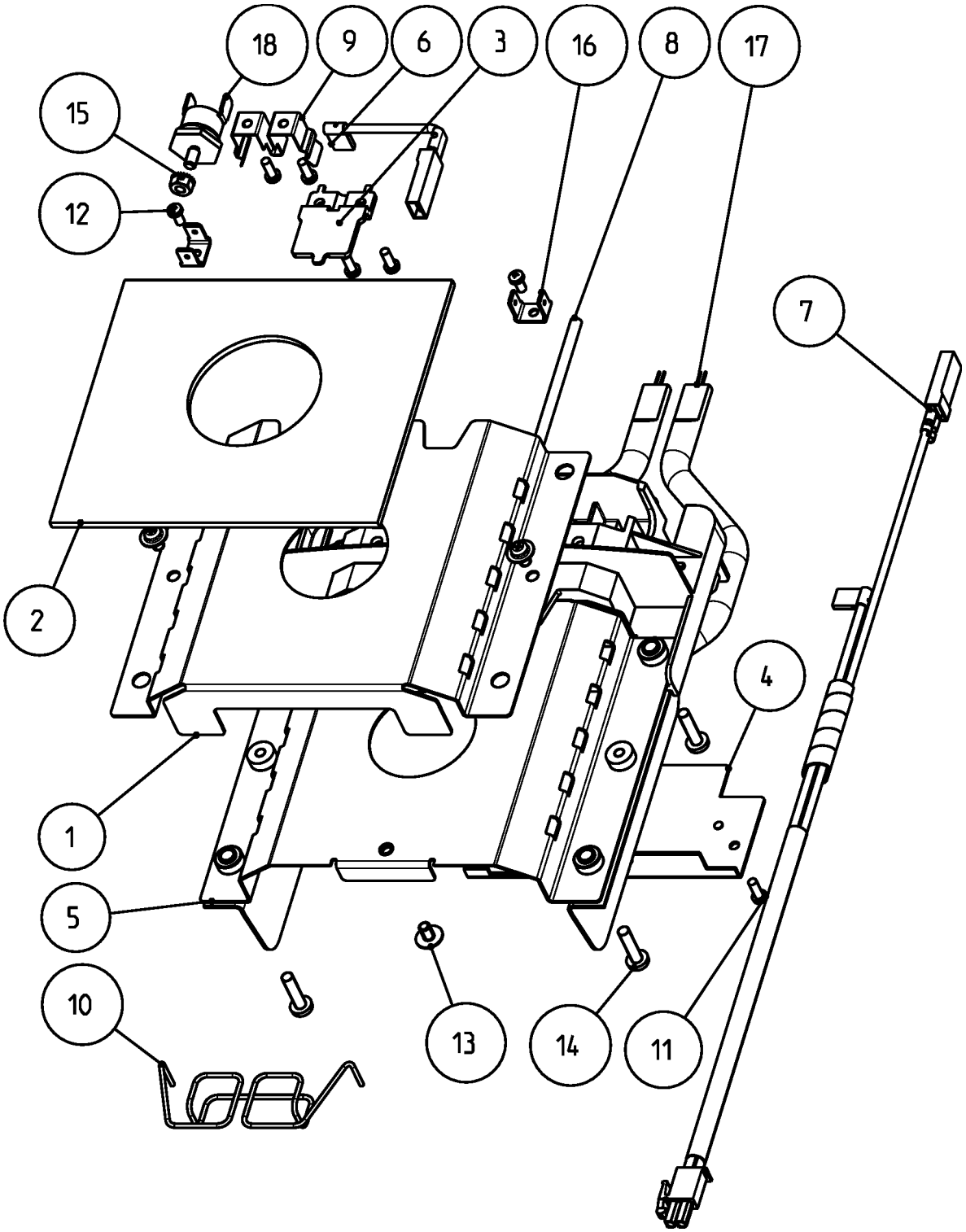
Key-No.	Part-No.	Description
1	330-2000	Protection plate
2	330-2023	Cover
3	330-3000	Axis
4	330-3005	Plunger
5	330-4001	Base
6	330-7019	Fan
7	330-7200-	Heating board
8	F2-159	Pressure spring
9	F3-189	Torsion spring
10	PN 1053-004	Rubber stop
11	PN 1100-054	Screw KA30x8
12	PN 1100-062	Screw M3x8
13	PN 1100-148	Screw M4x20
14	PN 1500-004	Lock washer
15	PN 1500-051	Lock washer
16	PN 3612-315	Fuse 3.15A T 230V
16	PN 3612-630	Fuse 6.3A T 115V

2.4 Hood halogen



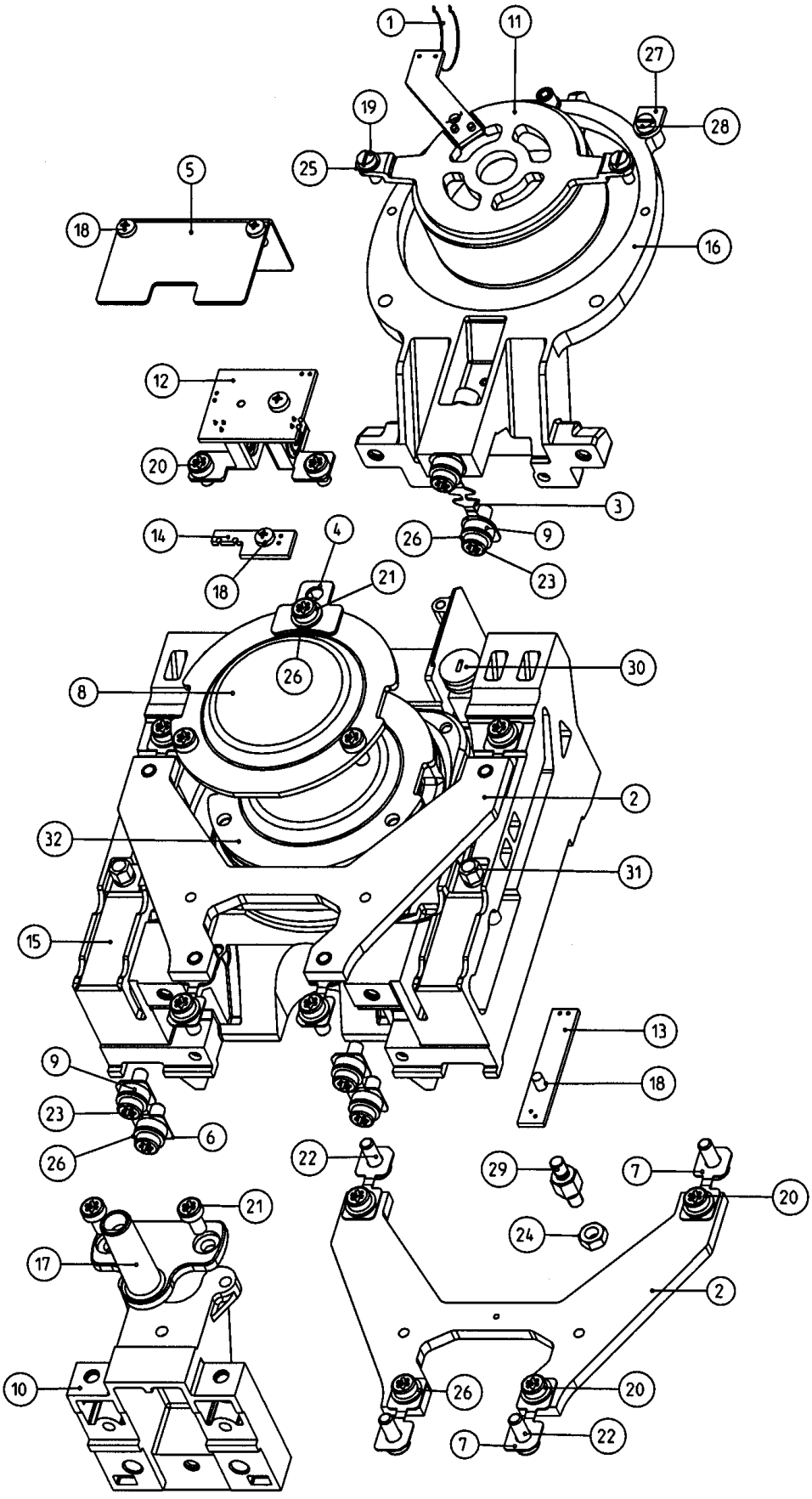
Key-No.	Part-No.	Description
1	330-2008	Glass holder left
2	330-2009	Glass holder right
3	330-2014	Radiator plate cpl.
4	330-2016	Glass holder middle
5	330-2020	Insert
6	330-4002	Hood
7	330-4003	Inserted cover
8	330-4007	Inspection glass
9	350-4063	Caution label „hot“
10	PN 1100-043	Screw D2.9x6.5
11	PN 1100-064	Screw M4x6
12	PN 1100-170	Screw M4x8
13	PN 1300-050	Speed nut D2.9
14	330-4007	Inspection glass

2.5 Halogen radiator unit



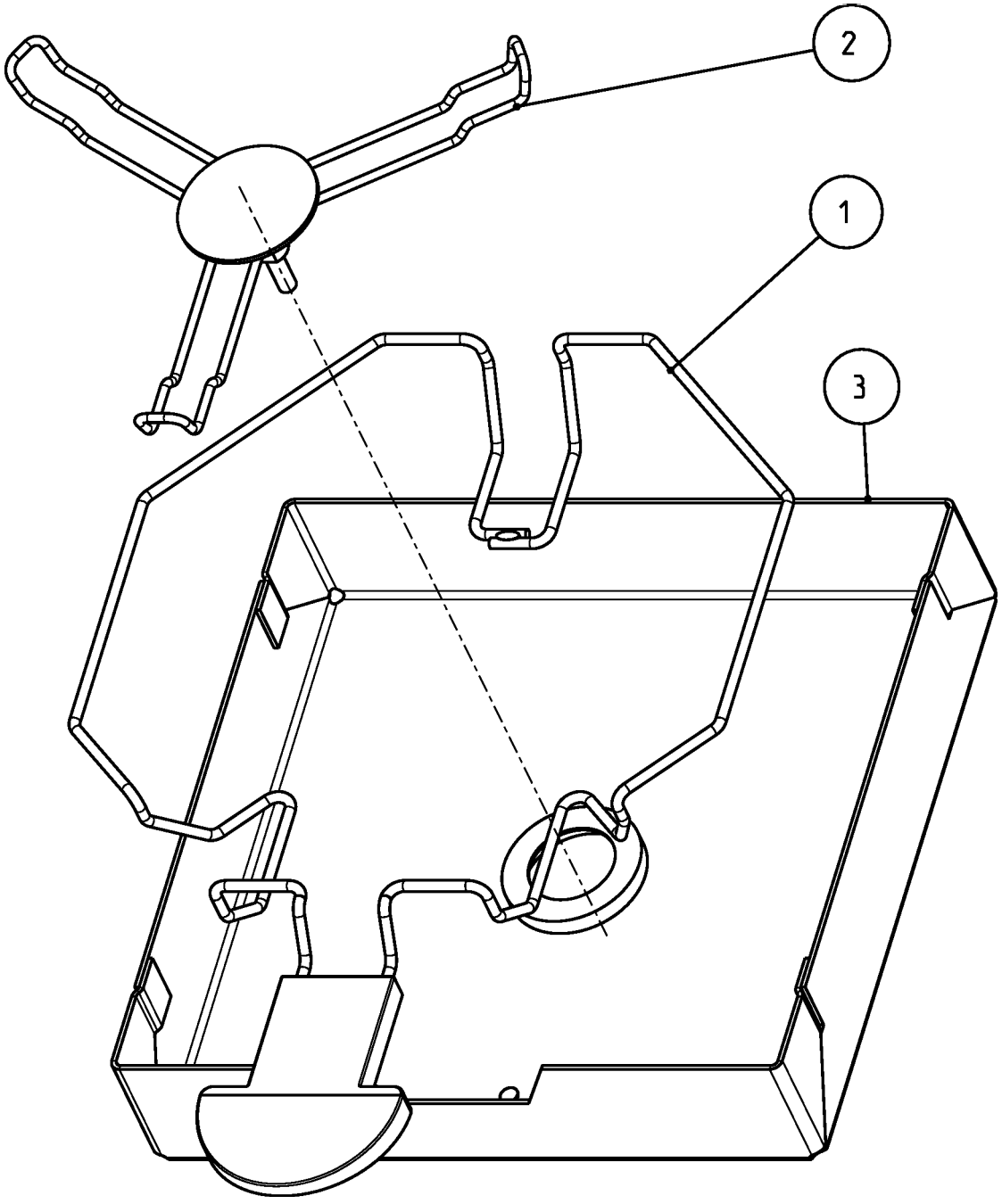
Key-No.	Part-No.	Description
1	330-2003	Heat shield
2	330-4006	Safety glass
3	330-4009	Sensor holding plate
4	330-7013	Cover
5	330-7016	Radiator unit pre-
6	330-7023	Connecting cable
7	330-7025	Radiator cable
8	330-8005	Temperature sensor
9	F4-182	Mounting clip
10	F4-183	Holder spring
11	PN 1100-054	Screw KA30x8
12	PN 1100-208	Screw KA30x6
13	PN 1100-211	Screw M4x6
14	PN 1100-213	Screw M4x16
15	PN 1300-051	Combo nut M4
16	PN 3500-022	U-tab 6.3mm
17	PN 3650-008	Halogen radiator 115V
17	PN 3650-009	Halogen radiator 230V
18	PN 3650-010	Temp. safety switch

2.6 Weighing cell



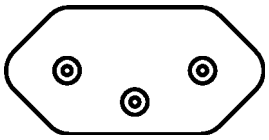
Key-No.	Part-No.	Description
1	300-7024	Connecting wire
2	320-2004	Flexure holder
3	320-2021	Flexure strap Th 1.2mm
4	320-2032	Transport safety device
5	320-2034	Sensor mechanism plate
6	320-2041	Flexure sheet Th 3mm
7	320-2045	Flexure sheet Th 3mm
8	320-2048	Magnet cover
9	320-3013	Base round
10	320-5019	Support piece 1:4.5
11	320-7006	Coil
12	320-8011	Sensor mechanism (incl. Key-No. 13 and 14)
13	-	Sensor board
14	-	Connecting board
15	320-8000	Chassis
16	320-8010	Balance arm 1:4.5
17	330-7036	Cone extension
18	PN 1100-023	Screw M3x6
19	PN 1100-040	Screw M3x8
20	PN 1100-169	Screw M4x6
21	PN 1100-170	Screw M4x8
22	PN 1100-171	Screw M4x10
23	PN 1100-172	Screw M4x12
24	PN 1300-008	Nut M4
25	PN 1500-001	Washer M3
26	PN 1500-075	Spring washer M4
27	280-2003	Stopper
28	PN 1100-039	Screw M3x5
29	320-3018	Distance bolt
30	240-4048	Symmetry screw
31	320-3019	Corner load screw
32	320-7035	Magnet

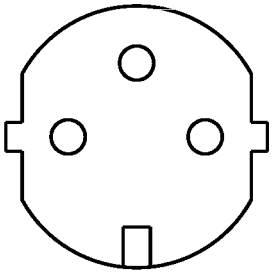
2.7 Internal parts

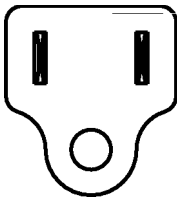


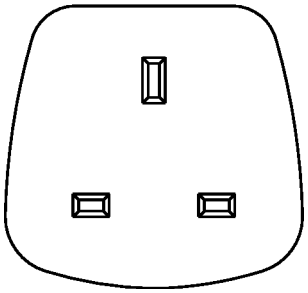
Key-No.	Part-No.	Description
1	330-7003	Sample holder
2	330-7004	Pan support
3	330-7011	Wind shield

2.8 Mains cable

1 

3 

2 

4 

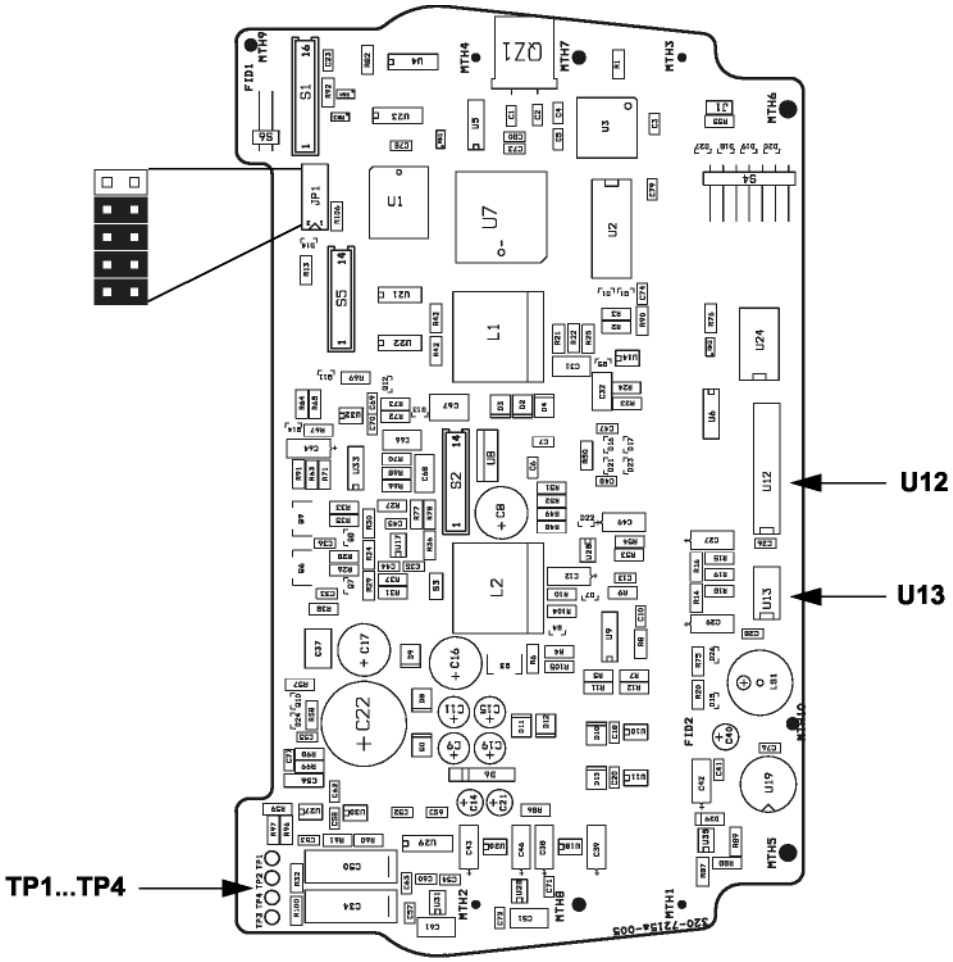
Key-No.	Part-No.	Description
1	PN 3602-401	Mains cable CH
2	PN 3602-400	Mains cable Schuko
3	PN 3602-402	Mains cable USA
4	PN 3602-403	Mains cable UK

3. Electronics

3.1 Main board320-7215-020

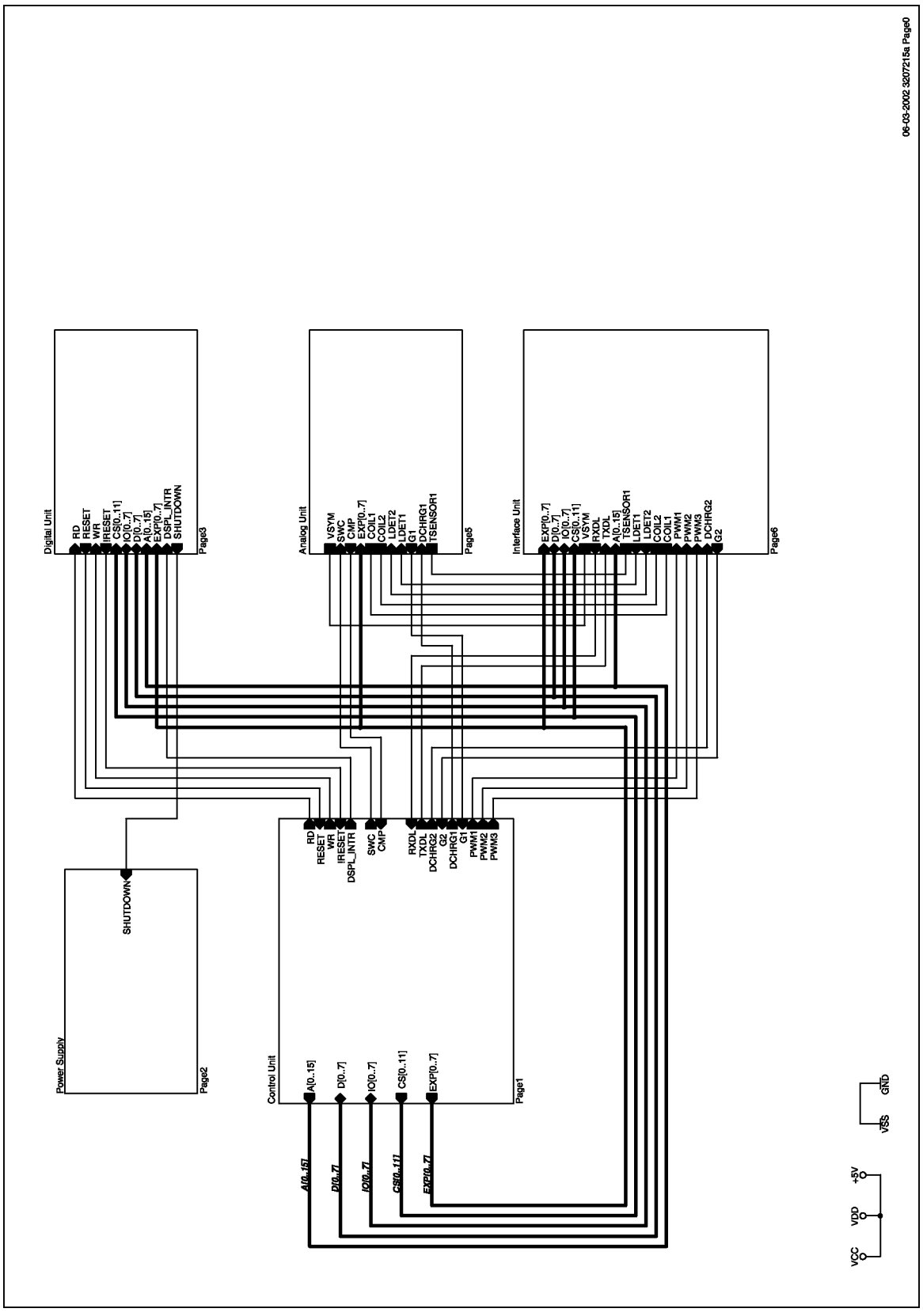
3.1.1 Exchange of the main board 320-7215-020

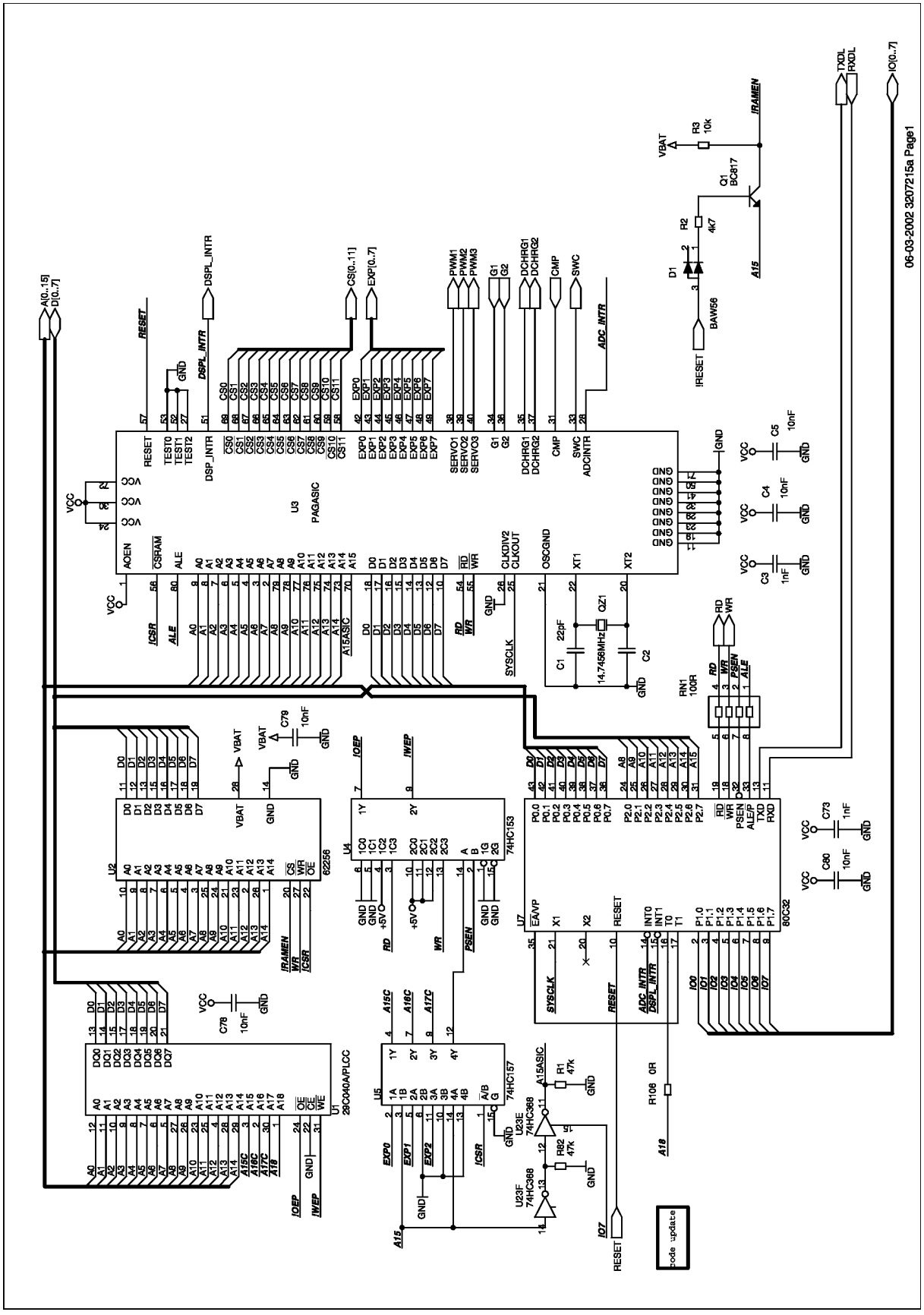
The new basic version of the main board 320-7215-020 is applicable for moisture analyzer with software N5x-xxxx-xxx.
The drawing below shows which hardware components are to be converted by an exchange of a main board.

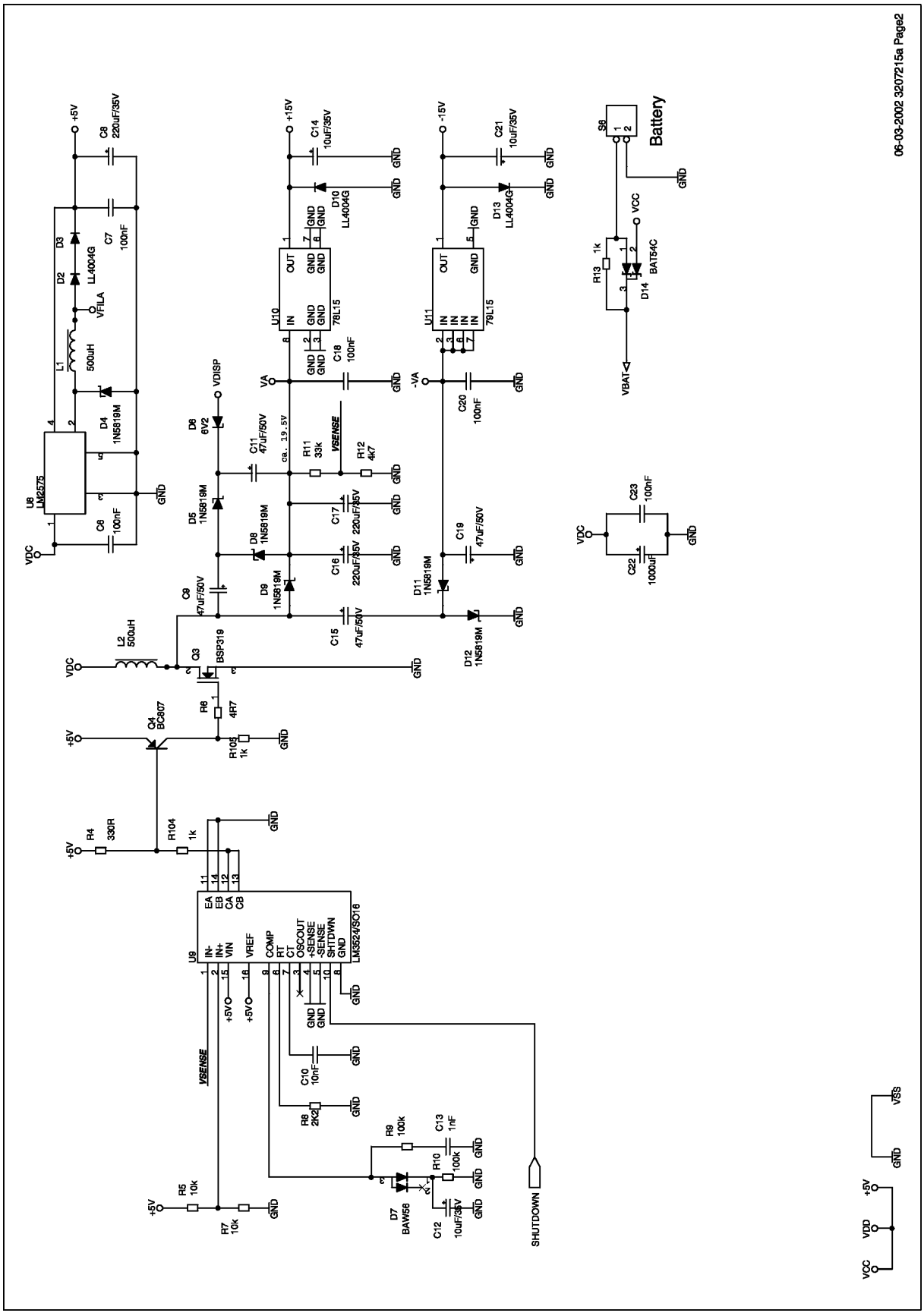


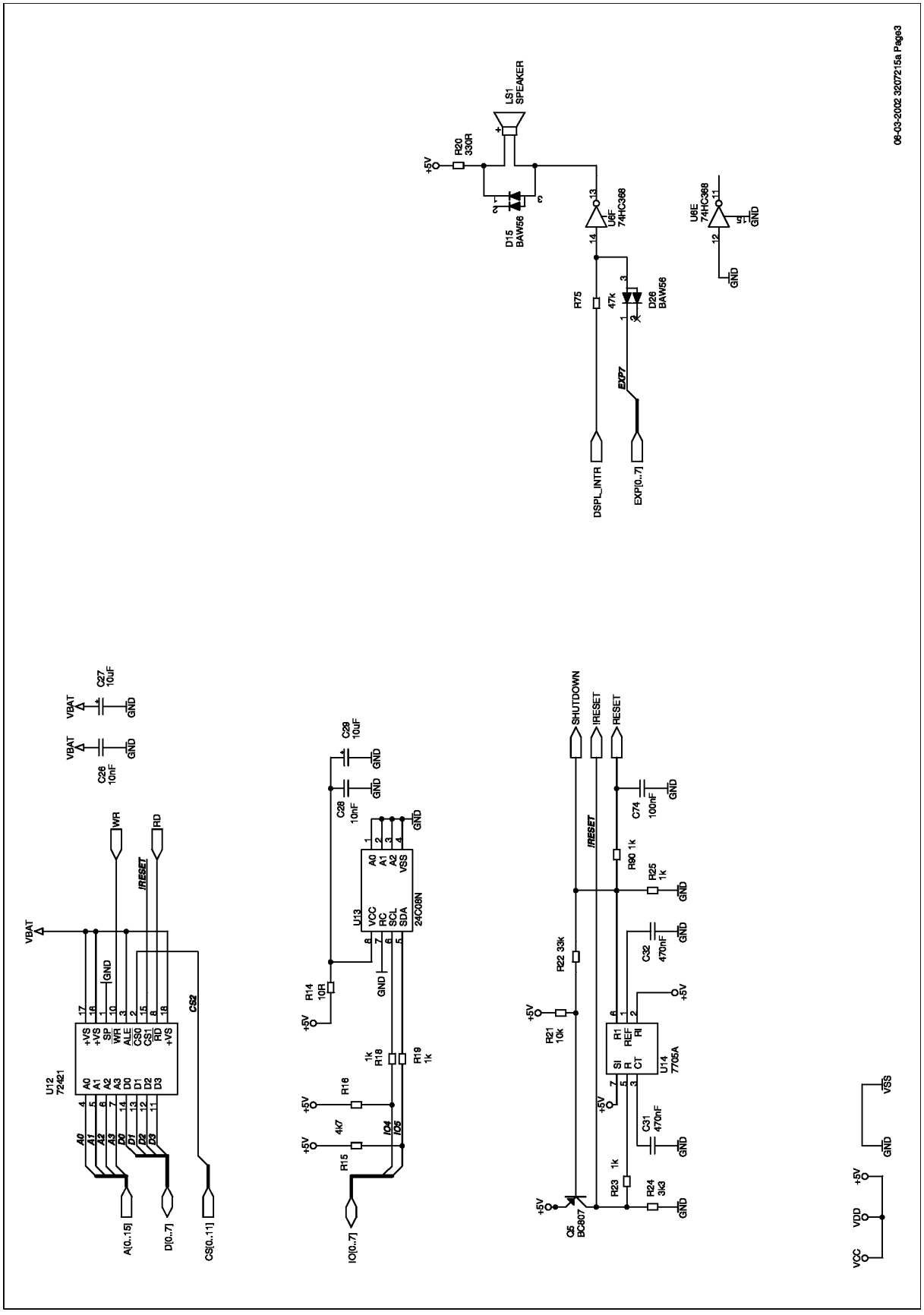
Position	Description
U13	EEPROM
U12	Real time clock
TP1-TP4	Measuring resistor

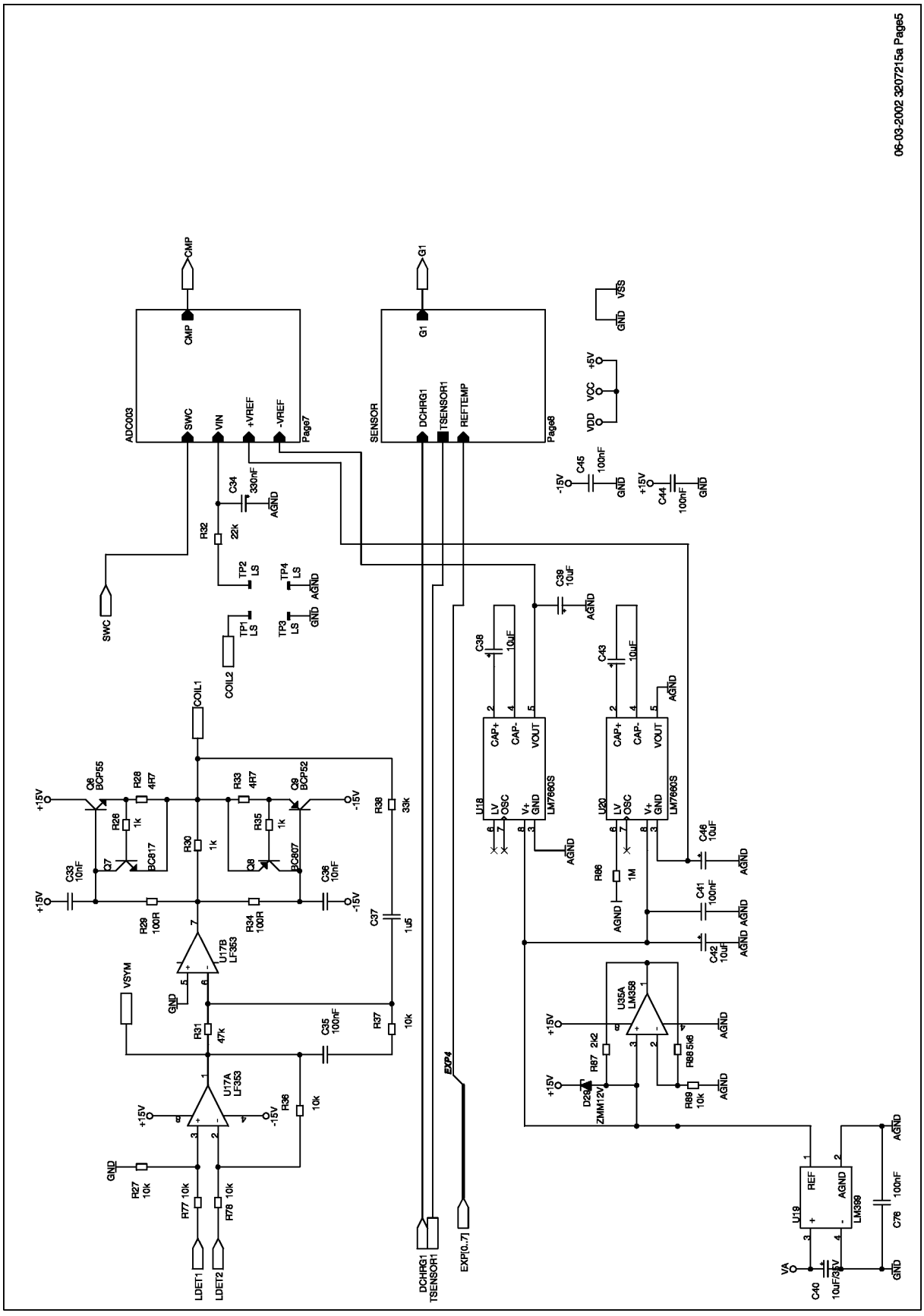
3.1.2 Schematic 320-7215-020

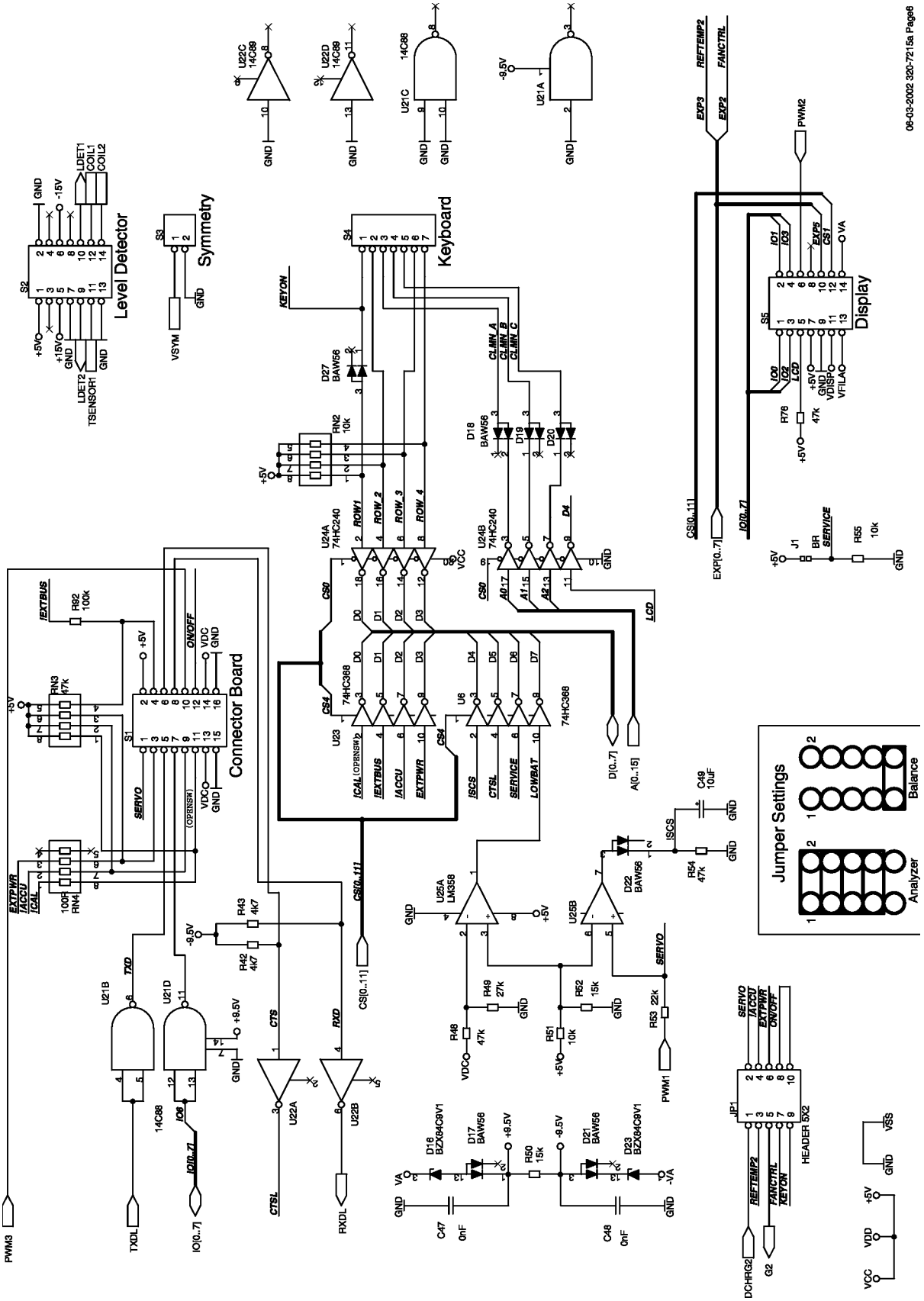


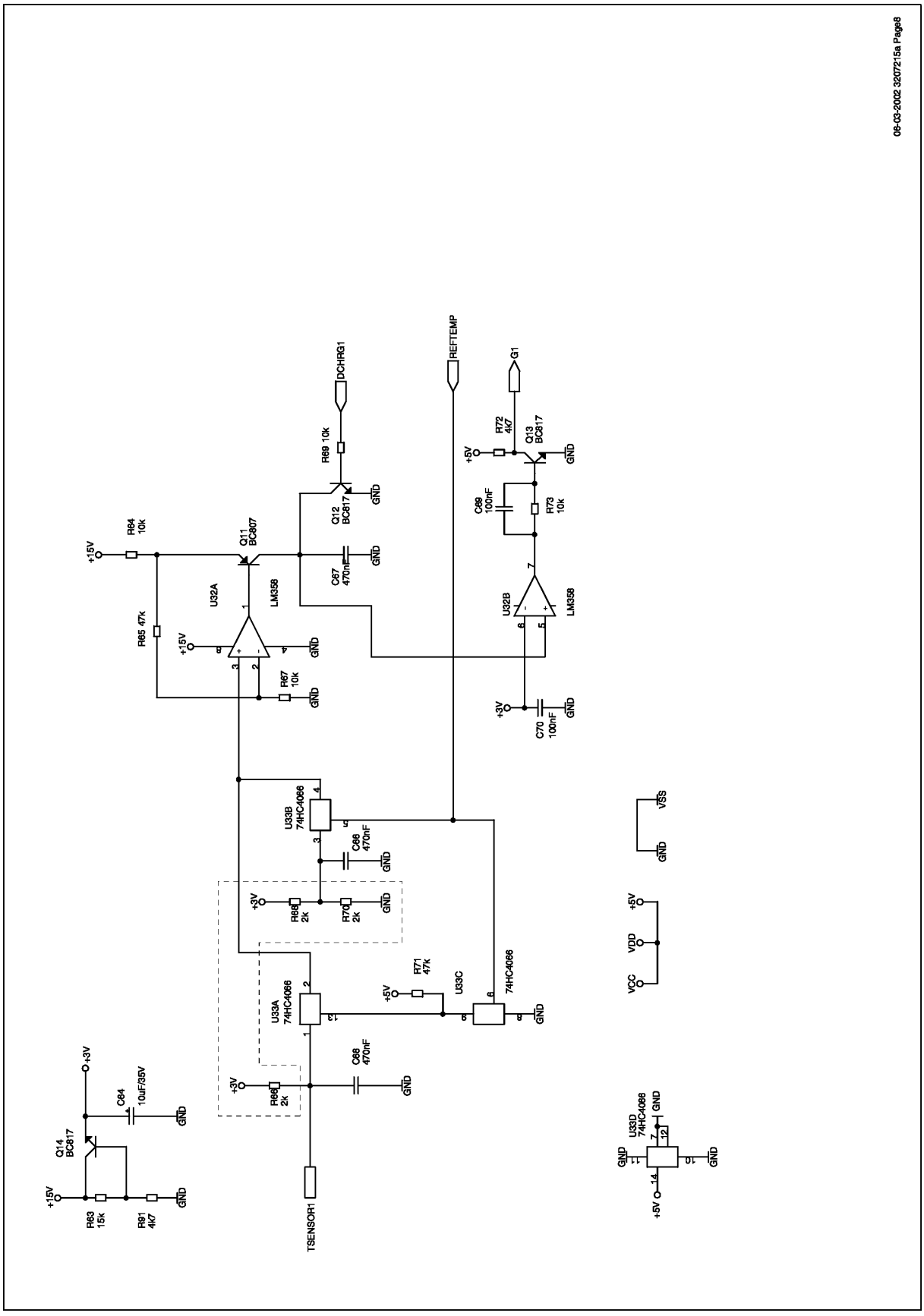

A[0..15]
D[0..7]
RESET
DSPL_INTR
CS[0..11]
EXP[0..7]
PWM1
PWM2
PWM3
G1
G2
DCHRG1
DCHRG2
CMP
SWC
ADC INTR
U3
PAGASIC
U2
62256
U4
74HC153
U5
74HC157
U1
29C040A/PLCC
U7
80C32
U23F
74HC368
U23E
74HC368
A15ASIC
Y1
14.7456MHz
C1
22pF
C2
C3
1nF
C4
10nF
C5
10nF
C73
1nF
C78
10nF
C79
10nF
C80
10nF
R1
47k
R2
4k7
R3
10k
R92
47k
R106
0R
RN1
100R
D1
BAW56
Q1
BC817
VBAT
!RESET
IRAMEN
TXDL
RXDL
IO[0..7]
06-03-2002 3207215a Page1
Code update


06-03-2002 3207215a Page2
Battery
SHUTDOWN
VSENSE
VSENSE
LM3524/SO16
78L15
79L15
BAT54C
BC807
BSP319
LM2575
LL4004G
1N5819M
BAW56

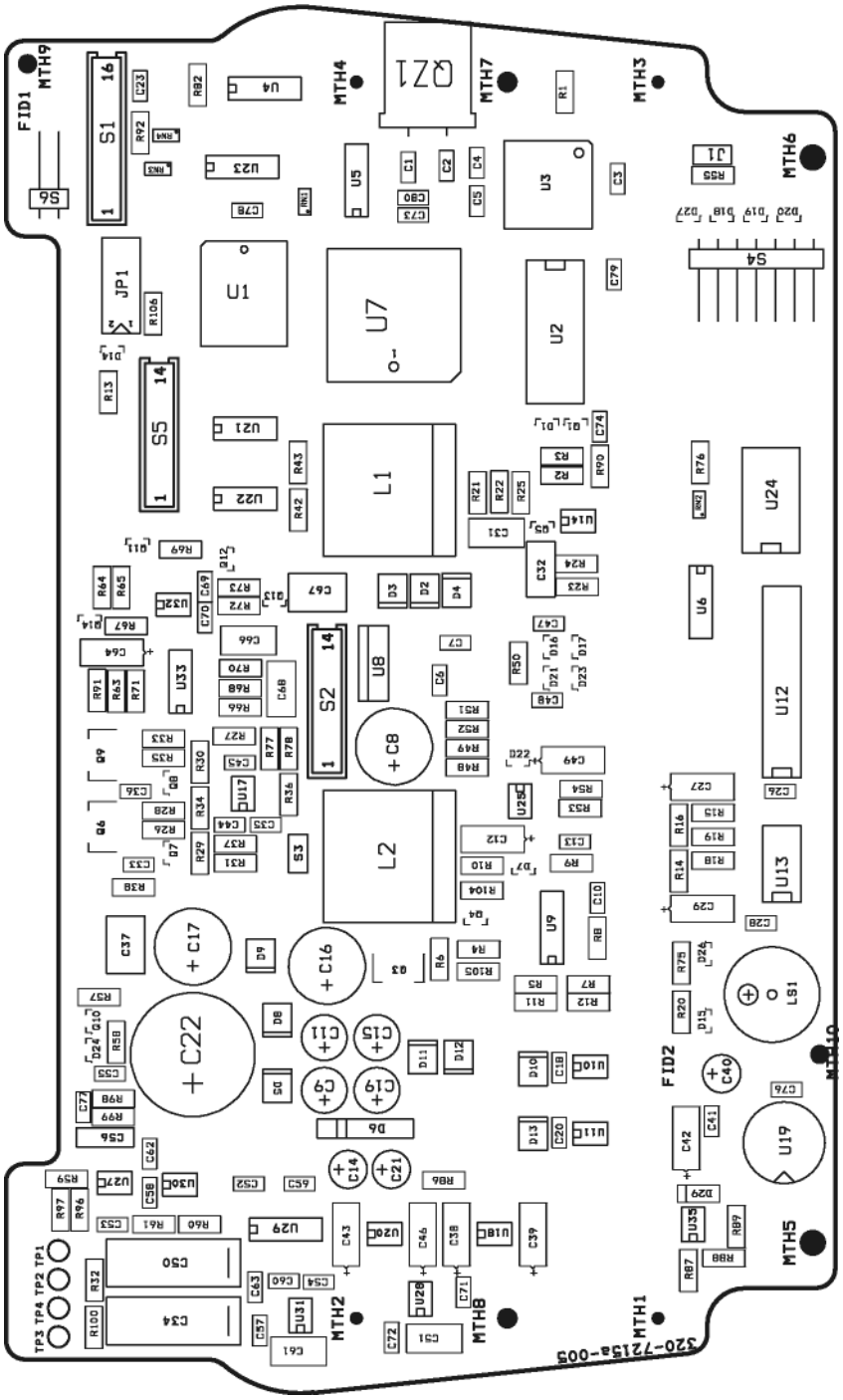

06-03-2002 3207215a Page3
LS1 SPEAKER
R20 330R
+5V
D15 BAW56
U8F 74HC388
U8E 74HC388
R75 47k
D26 BAW56
EXP7
DSPI_INTR
EXP[0..7]
GND
VBAT
C27 10uF
C26 10nF
WR
RD
IRESET
CS2
U12 72421
A0 A1 A2 A3 D0 D1 D2 D3
A[0..15]
D[0..7]
CS[0..11]
C29 10uF
C28 10nF
U13 24C08N
A0 A1 A2 VSS VCC RC SCL SDA
R14 10R
R16 4k7
R15
R18 1k
R19 1k
IO4
IO5
IO[0..7]
SHUTDOWN
IRESET
RESET
R22 33k
R21 10k
R90 1k
R25 1k
C74 100nF
C32 470nF
C31 470nF
R23 1k
R24 3k3
Q5 BC807
U14 7705A
R1 REF RI SI R CT
VSS
VDD
VCC


06-03-2002 3207215a Page5
ADC003
SWC
VIN
+VREF
-VREF
CMP
Page7
SENSOR
DCHRG1
TSENSOR1
REFTEMP
G1
Page8
VSS
GND
VDD
VCC
+5V
C45 100nF
C44 100nF
-15V
+15V
C34 330nF
AGND
R32 22k
TP2 LS
TP4 LS
TP1 LS
TP3 LS
COIL2
COIL1
C39 10uF
C38 10uF
C43 10uF
U18 LM7660S
U20 LM7660S
CAP+
CAP-
VOUT
LV
OSC
V+
Q6 BCP55
Q9 BCP52
Q7 BC817
Q8 BC807
R28 4R7
R33 4R7
R29 1k
R30 1k
R35 1k
R38 33k
C33 10nF
C36 10nF
R29 100R
R34 100R
C37 1u5
U17B LF353
U17A LF353
VSYM
R31 47k
C35 100nF
R37 10k
R36 10k
R27 10k
R77 10k
R78 10k
LDET1
LDET2
EXP4
EXP[0..7]
DCHRG1
TSENSOR1
R86 1M
C46 10uF
C41 100nF
C42 10uF
U35A LM358
R87 2k2
R88 5k6
D29 ZMM12V
R89 10k
U19 LM399
REF
C40 10uF/35V
C76 100nF
VA


Level Detector
Symmetry
Keyboard
Display
Connector Board
Jumper Settings
Balance
Analyzer
08-03-2002 320-7215a Page6


08-03-2002 3207215a Page8
REFTEMP
DCHRG1
G1
R69 10k
Q12 BC817
R72 4k7
Q13 BC817
C69 100nF
R73 10k
R64 10k
Q11 BC807
C87 470nF
U32A
LM358
U32B
LM358
R65 47k
R67 10k
C70 100nF
U33B 74HC4066
C86 470nF
R68 2k
R70 2k
R71 47k
U33C
74HC4066
U33A 74HC4066
C88 470nF
R66 2k
TSENSOR1
Q14 BC817
C84 10uF/35V
R63 15k
R91 4k7
VSS
VDD
VCC
U33D 74HC4066
+15V
+5V
+3V
GND

3.1.3 Assembly 320-7215-020



3.1.4 Parts list 320-7215-020

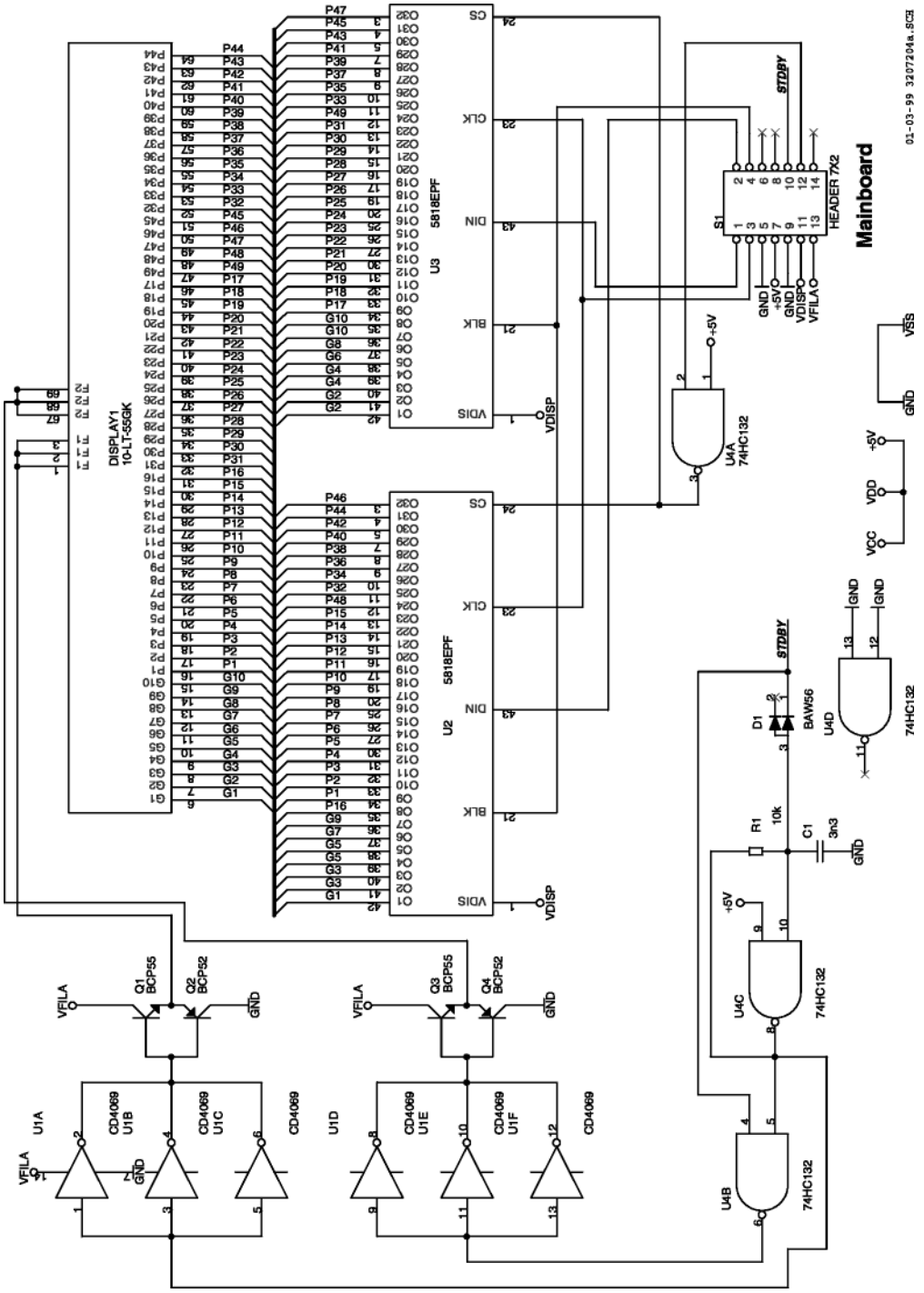
Item	Quantity	Reference	Type	Part
1	1	U2	62256	PN 3023-005
2	1	U3	PAGASIC	PN 3022-047
3	1	U7	80C52	PN 3022-054
4	1	U21	14C88	PN 3023-001
5	1	U22	14C89	PN 3023-002
6	1	U33	HEF4066	PN 3023-003
7	1	U14	TL7705A	PN 3023-006
8	1	U5	74HC157	PN 3023-008
9	1	U24	74HC240	PN 3023-009
10	2	U6,U23	74HC368	PN 3023-010
11	1	U4	74HC153	PN 3023-012
12	1	U29	DG413	PN 3030-100
13	3	U25,U32,U35	LM358	PN 3030-101
14	3	U28,U30,U31	OP177GS	PN 3030-102
15	2	U17,U27	LF353	PN 3030-103
16	1	U9	LM3524	PN 3031-001
17	2	U18,U20	LM7660S	PN 3031-002
18	1	U10	78L15	PN 3031-003
19	1	U11	79L15	PN 3031-004
20	1	U8	LM2575	PN 3050-200
21	1	Q6	BCP55	PN 3140-001
22	1	Q9	BCP52	PN 3140-002
23	6	Q1,Q7,Q10,Q12,Q13,Q14	BC817	PN 3140-003
24	4	Q4,Q5,Q8,Q11	BC807	PN 3140-004
25	1	Q3	BSP319	PN 3140-005
26	12	D1,D7,D15,D17,D18,D19,D20,D21,D22,D24 D26,D27	BAW56	PN 3145-001
27	1	D14	BAT54C	PN 3145-002
28	4	D2,D3,D10,D13	LL4004G	PN 3145-003
29	6	D4,D5,D8,D9,D11,D12	1N5819M	PN 3145-004
30	1	U19	LM399H	PN 3220-101
31	1	D6	ZPD6.2	PN 3241-962
32	1	D29	ZMM12V	PN 3245-012
33	1	R100	0R	PN 3306-000
34	1	R14	10R	PN 3306-010
35	2	R34,R29	100R	PN 3306-110
36	2	R4,R20	330R	PN 3306-133
37	13	R13,R18,R19,R23,R25,R26,R30,R35,R90, R98,R99,R104,R105	1k	PN 3306-210
38	3	R66,R68,R70	2k	PN 3306-220

Item	Quantity	Reference	Type	Part
39	2	R8,R87	2k2	PN 3306-222
40	1	R24	3k3	PN 3306-233
41	9	R2,R12,R15,R16,R42,R43,R72,R91,R96	4k7	PN 3306-247
42	*22*	*R3,R5,R7,R21,R27,R36,R37,R51,R55,R57, R58,R59,R60,R61,R64,R67,R69,R73,R77, R78, R89,R97*	*10k*	*PN 3306-310*
43	*3*	*R50,R52,R63*	*15k*	*PN 3306-315*
44	*1*	*R88*	*5k6*	*PN 3306-256*
45	*2*	*R32,R53*	*22k*	*PN 3306-322*
46	*1*	*R49*	*27k*	*PN 3306-327*
47	*3*	*R11,R22,R38*	*33k*	*PN 3306-333*
48	*9*	*R1,R31,R48,R54,R65,R71,R75,R76,R82*	*47k*	*PN 3306-347*
49	*3*	*R9,R10,R92*	*100k*	*PN 3306-410*
50	*1*	*R86*	*1M*	*PN 3306-510*
51	*3*	*R6,R28,R33*	*4R7*	*PN 3306-947*
52	*2*	*RN1,RN4*	*100R*	*PN 3361-110*
53	*1*	*RN2*	*10k*	*PN 3361-310*
54	*1*	*RN3*	*47k*	*PN 3361-347*
55	*1*	*C56*	*100nF*	*PN 3401-410*
56	*1*	*C67*	*470nF*	*PN 3401-447*
57	*1*	*C37*	*1u550V*	*PN 3401-515*
58	*1*	*C50*	*330nF*	*PN 3420-433*
59	*3*	*C8,C16,C17*	*220uF/35V*	*PN 3426-722*
60	*4*	*C9,C11,C15,C19*	*47uF/50V*	*PN 3428-648*
61	*1*	*C22*	*1000uF*	*PN 3428-810*
62	*3*	*C14,C21,C40*	*10uF/35V*	*PN 3438-610*
63	*2*	*C1,C2*	*22pF*	*PN 3440-022*
64	*1*	*C77*	*100pF*	*PN 3440-110*
65	*3*	*C3,C13,C73*	*1nF*	*PN 3440-210*
66	*1*	*C53*	*1.8nF*	*PN 3440-218*
67	*10*	*C4,C5,C10,C26,C28,C33,C36,C78,C79,C80*	*10nF*	*PN 3440-310*
68	*24*	*C6,C7,C18,C20,C23,C35,C41,C44,C45,C52 ,C54,C55,C57,C58,C59,C60,C62,C63,C69, C70,C71,C72,C74,C76*	*100nF*	*PN 3440-410*
69	*6*	*C31,C32,C51,C61,C66,C68*	*470nF*	*PN 3440-447*
70	*10*	*C12,C27,C29,C38,C39,C42,C43,C46,C49 C64*	*10uF/35V*	*PN 3450-610*
71	*2*	*S5,S5*	*7X2*	*PN 3502-002*
72	*1*	*S1*	*8X2*	*PN 3502-003*
73	*2*	*J1,S3*	*1X2*	*PN 3504-302*
74	*1*	*JP1*	*5X2*	*PN 3504-310*
75	*1*	*S6*	*1X2*	*PN 3504-360*

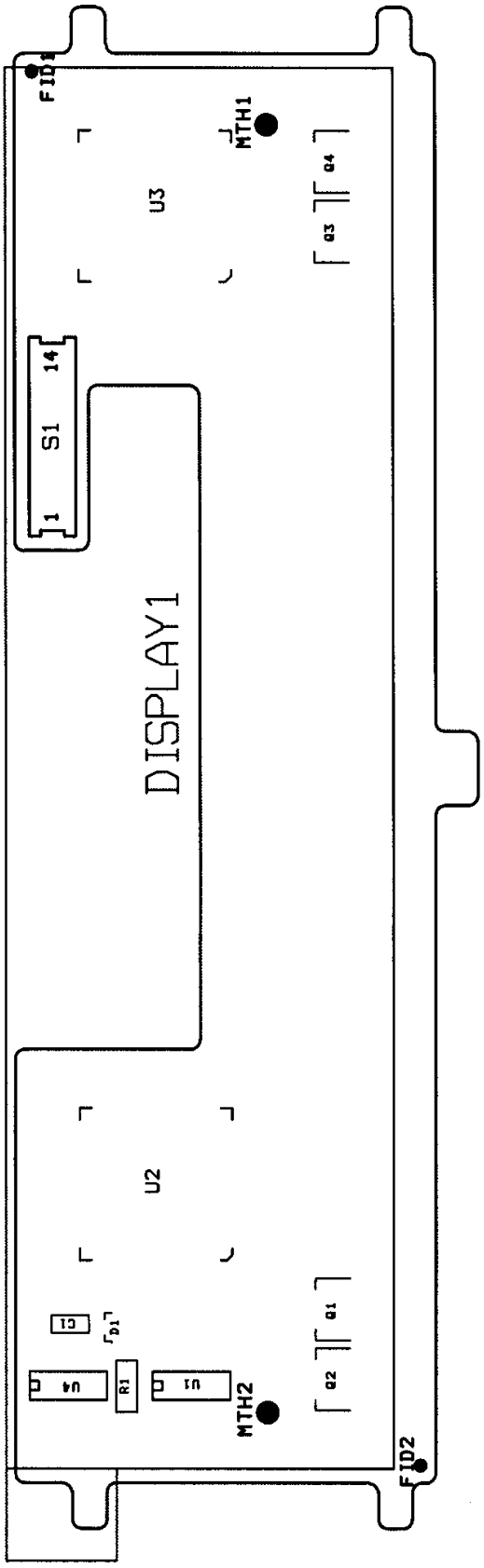
Item	Quantity	Reference	Type	Part
76	1	S4	1X7	PN 3504-368
77	1	LS1	QMP-111P	PN 3607-001
78	2	L1,L2	500uH	PN 3680-002
79	1	QZ1	14.7456MHz	PN 3881-013
80	1	C34	330nF	PN 3421-433
81	2	D16,D23	BZX84C9V1	PN 3244-991
82	1	U1	PLCC32	PN 3023-016
83	1	U12	72421	PN 3022-046
84	1	U13	24C08	PN 3022-053

3.2 Display board 330-7204-010

3.2.1 Schematic 320-7204-010



3.2.2 Assembly 320-7204-010

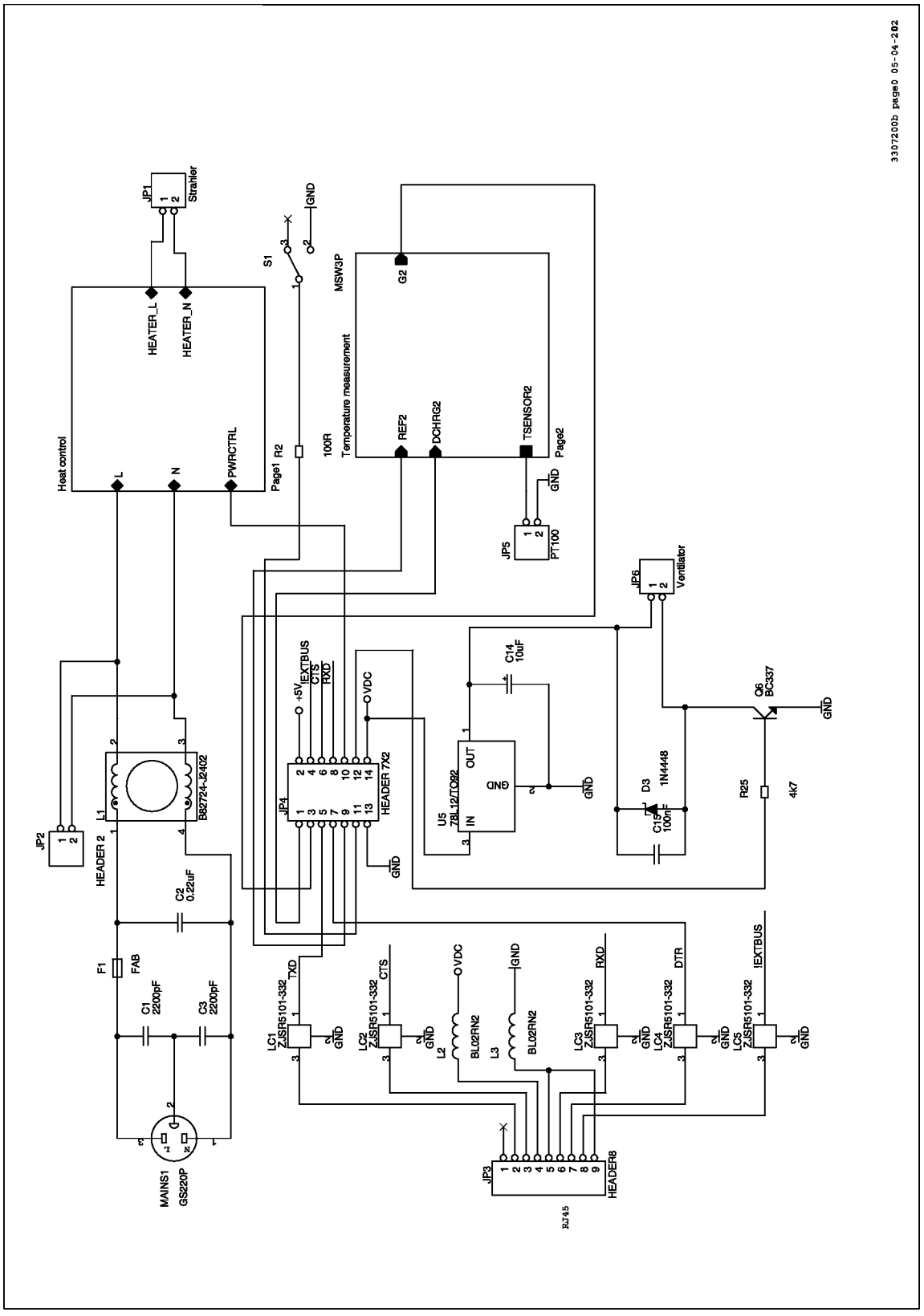


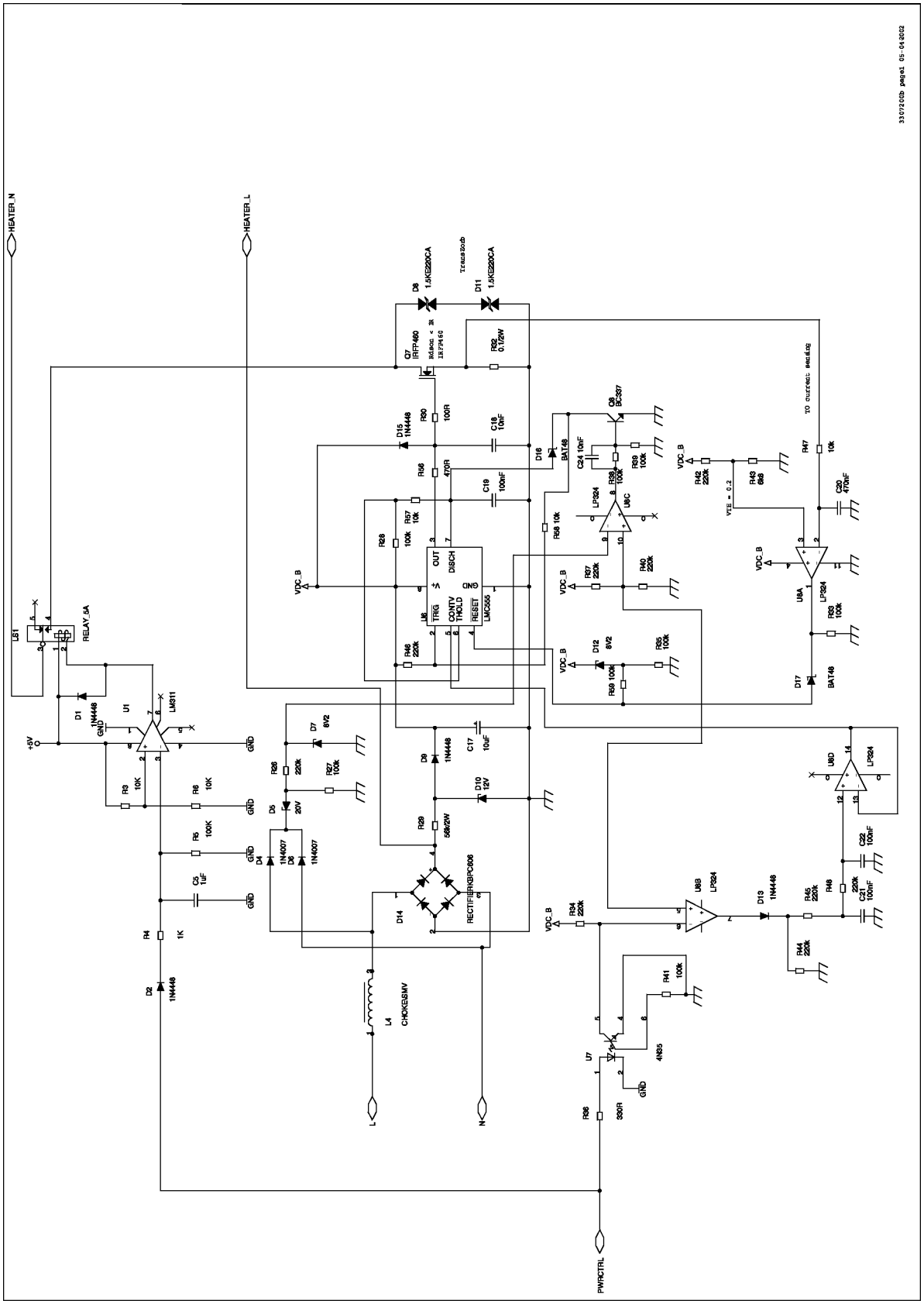
3.2.3 Parts list 320-7204-010

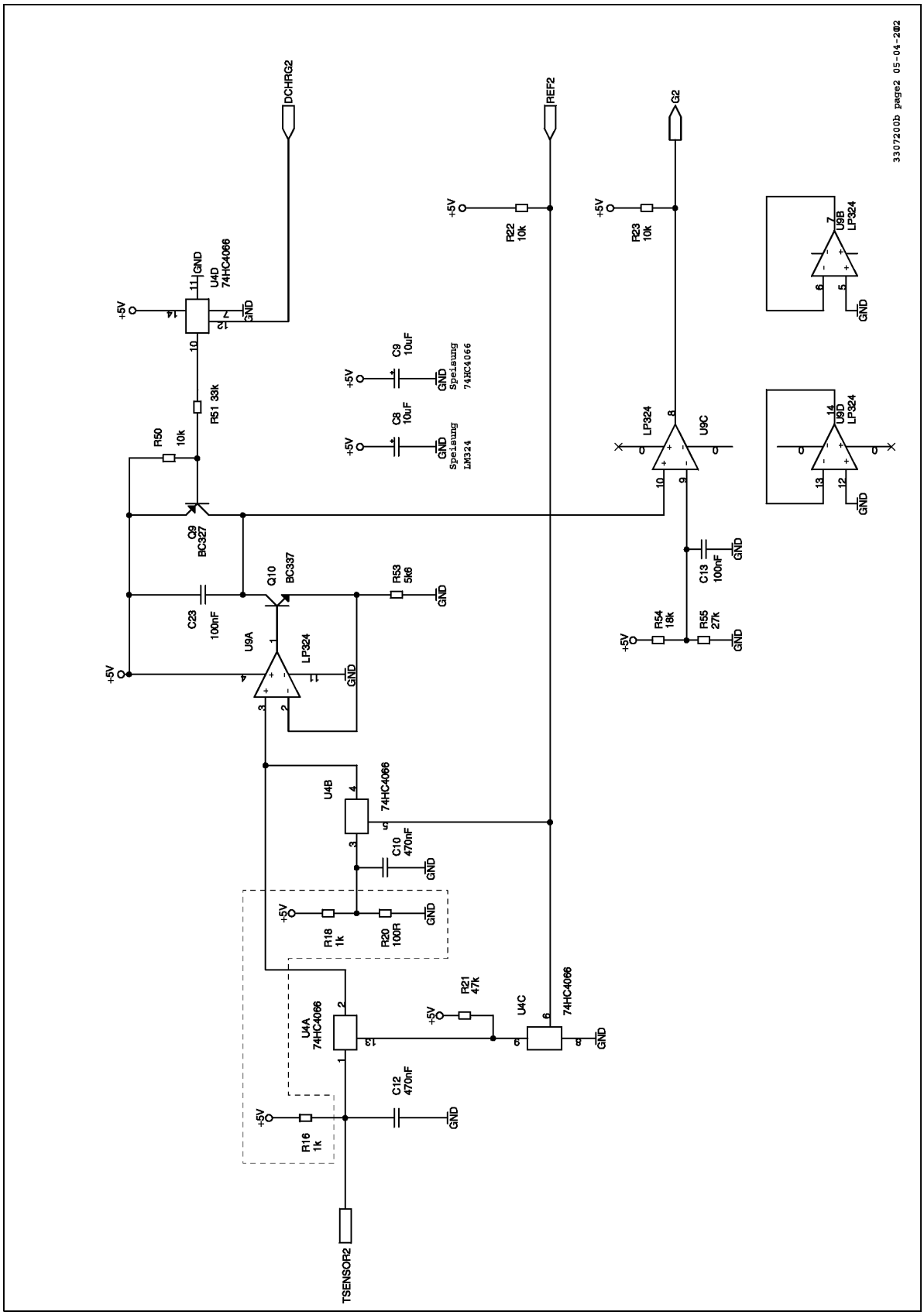
Item	Quantity	Reference	Type	Part
1	1	C1	3n3	PN 3440-233
2	1	DISPLAY1	10-LT-55GK	PN 3260-019
3	1	D1	BAW56	PN 3145-001
4	2	Q3,Q1	BCP55	PN 3140-001
5	2	Q4,Q2	BCP52	PN 3140-002
6	1	R1	10k	PN 3306-310
8	1	U1	CD4069	PN 3023-004
9	2	U2,U3	5818EPF	PN 3022-051
10	1	U4	74HC132	PN 3023-007

3.3 Heating board 330-7200-010

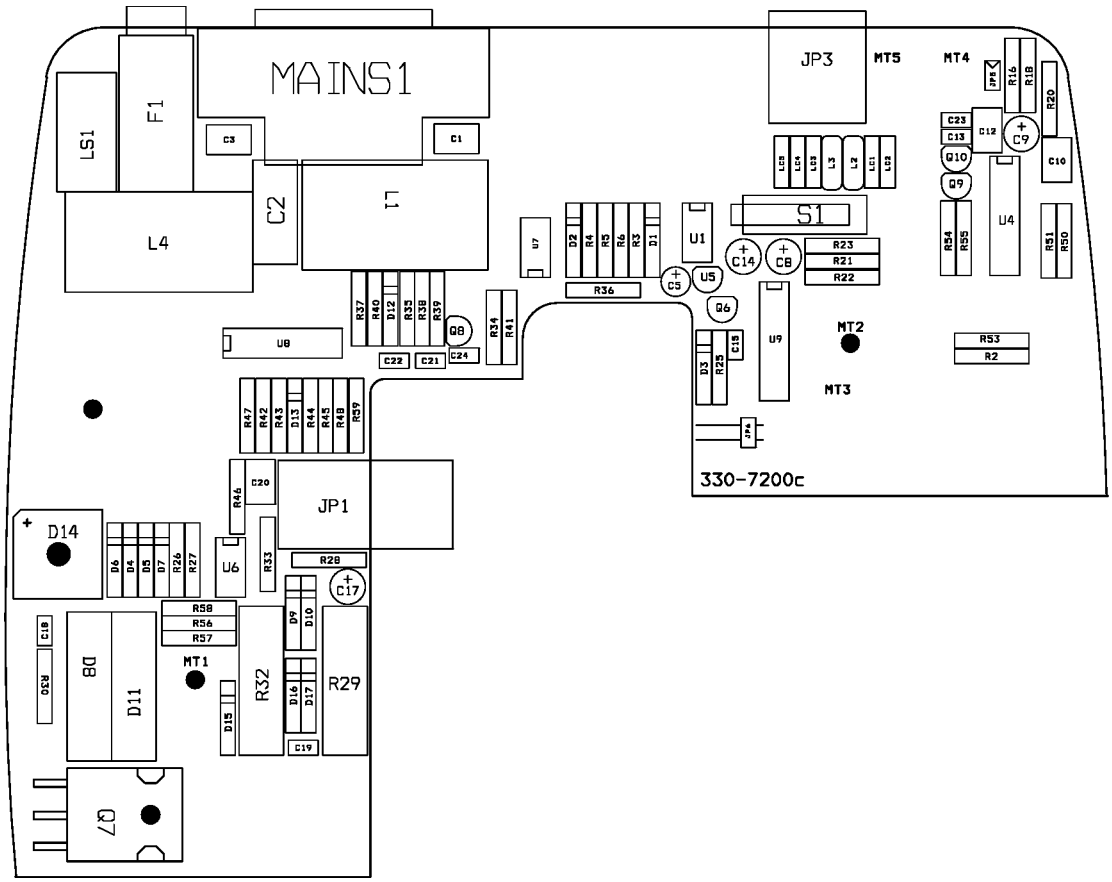
3.3.1 Schematic 330-7200-010




HEATER_N
HEATER_L
PWRCTRL
L
N
+5V
GND
VDC_B
RELAY_5A
LM311
LM555
LP324
IRFP460
RECTIFIERKBPC606
CHOKE5MV
4N35
BC337
BAT48
1N4448
1N4007
1.5KE220CA
TO current analog


3307200b page2 05-04-2002
DCHRG2
REF2
G2
TSENSOR2
+5V
GND
U4D 74HC4066
U4B 74HC4066
U4A 74HC4066
U4C 74HC4066
R22 10k
R23 10k
R50 10k
R51 33k
R53 5k6
R54 18k
R55 27k
R16 1k
R18 1k
R20 100R
R21 47k
C8 10uF
Spelsung LM324
C9 10uF
Spelsung 74HC4066
C10 470nF
C12 470nF
C13 100nF
C23 100nF
Q9 BC327
Q10 BC337
U9A LP324
U9B LP324
U9C LP324
U9D LP324

3.3.2 Assembly 330-7200-010



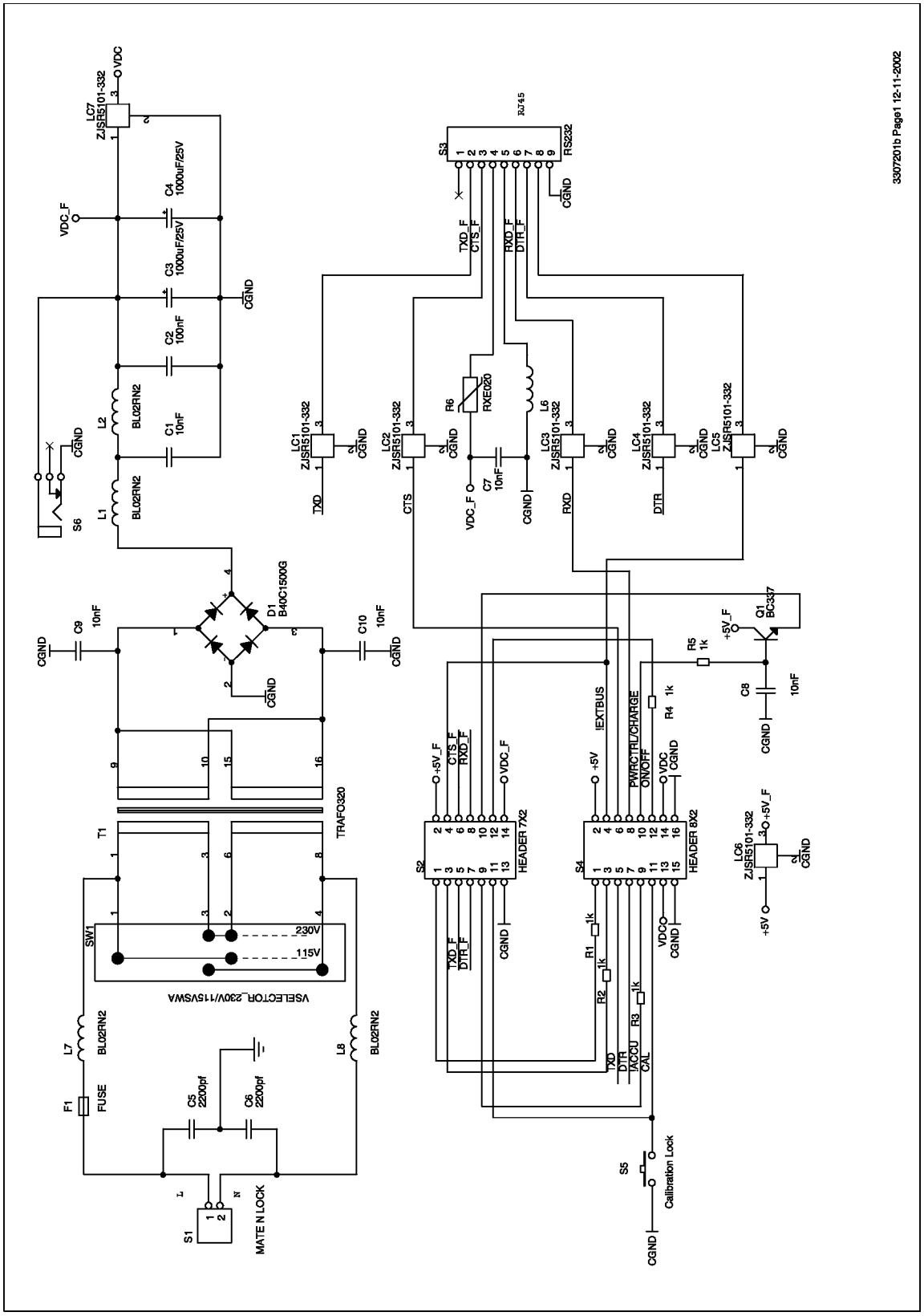
3.3.3 Parts list 330-7200-010

Item	Quantity	Reference	Type	Part
1	2	C1,C3	2200pF	PN 3870-004
2	1	C2	0.22uF	PN 3422-422
3	1	C5	1uF	PN 3435-510
4	4	C8,C9,C14,C17	10uF	PN 3438-610
5	3	C10,C12,C20	470nF	PN 3401-447
6	6	C13,C15,C19,C21,C22,C23	100nF	PN 3419-340
7	2	C18,C24	10nF	PN 3419-310
8	5	D1,D2,D3,D9,D13	1N4448	PN 3230-901
9	2	D4,D6	1N4007	PN 3210-008
10	1	D5	20V	PN 3241-020
11	2	D16,D17	BAT48	PN 3210-006
12	2	D7,D12	8V2	PN 3241-982
13	2	D11,D8	1.5KE220A	PN 3680-100
14	1	D10	12V/0.5W	PN 3241-012
15	1	D14	RECTIFIERKBPC60	PN 3220-010
16	1	F1	FAB	PN 3602-111
17	1	JP2	HEADER 2	PN 3602-301

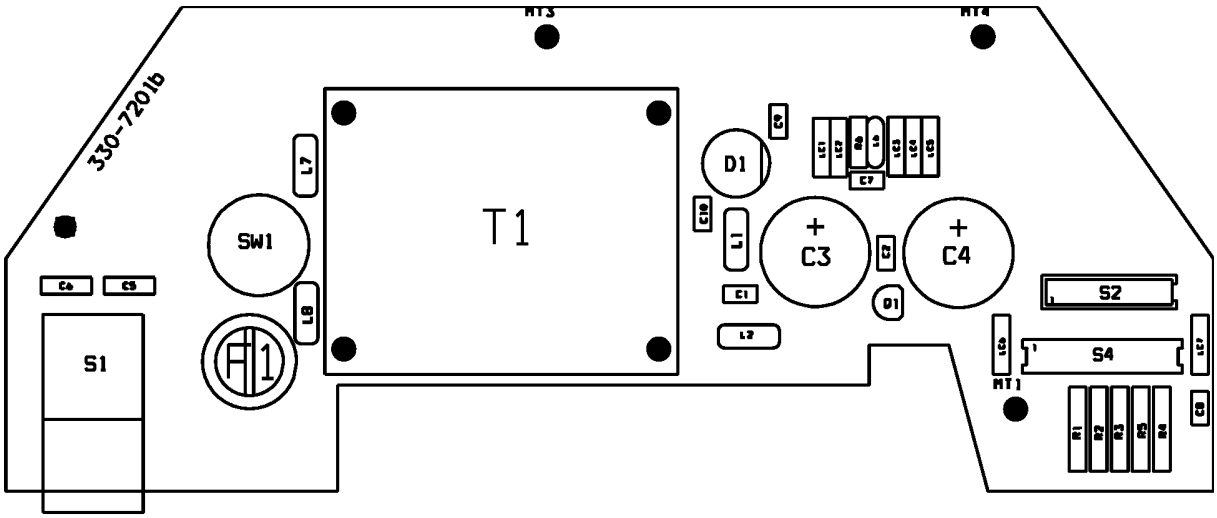
Item	Quantity	Reference	Type	Part
18	1	JP3	HEADER8	PN 3502-101
19	1	JP4	HEADER 7X2	PN 3502-002
20	1	JP5	PT100	PN 3504-302
21	5	LC1,LC2,LC3,LC4,LC5	ZJSR5101-332	PN 3680-007
22	1	LS1	RELAY_5A	PN 3604-104
23	1	L1	B82724-J2402	PN 3680-200
24	2	L2,L3	BL02RN2	PN 3680-008
25	1	MAINS1	GS220P	PN 3602-107
26	3	Q6,Q8,Q10	BC337	PN 3100-004
27	1	Q7	IRFP460	PN 3130-024
28	1	Q9	BC327	PN 3100-007
29	1	R1	910k	PN 3304-491
30	2	R20,R2	100R	PN 3304-110
31	9	R3,R6,R22,R23R30,R47,R50,R57,R5	10k	PN 3304-310
32	3	R4,R18,R16	1K	PN 3304-210
33	1	R21	47k	PN 3304-347
34	2	R25,R43	4k7	PN 3304-247
35	9	R26,R34,R37,R40,R42,R44,R45,R46,	220k	PN 3304-422
36	8	R5,R27,R28,R33,R35,R38,R39,R41	100k	PN 3304-410
37	1	R29	56k/2W	PN 3305-356
38	1	R31	22k	PN 3304-322
39	1	R32	0.1/2W	PN 3305-901
40	1	R36	330R	PN 3304-133
41	1	R51	33k	PN 3304-333
42	1	R53	5k6	PN 3304-256
43	1	R54	18k	PN 3304-318
44	1	R55	27k	PN 3304-327
45	1	S1	MSW3P	PN 3603-013
46	1	U1	LM311	PN 3030-029
47	1	U4	74HC4066	PN 3019-419
48	1	U5	78L12/TO92	PN 3050-022
49	1	U6	LMC555	PN 3030-036
50	1	U7	4N35	PN 3270-003
51	2	U8,U9	LP324	PN 3030-037

3.4 Power supply board 330-7201-010

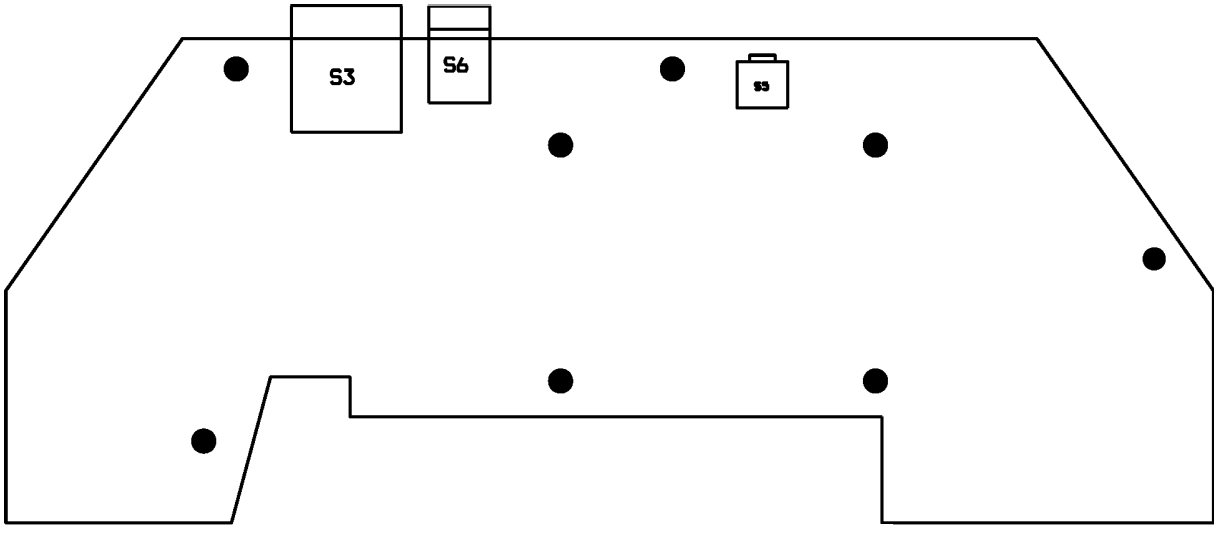
3.4.1 Schematic 330-7201-010



3.4.2 Assembly 330-7201-010



Upper side



Lower side

3.4.3 Parts list 330-7201-010

Item	Quantity	Reference	Type	Par
1	5	C1,C7,C8,C9,C10	10nF	PN 3419-310
2	1	C2	100nF	PN 3419-340
3	2	C3,C4	1000uF/50V	PN 3428-810
4	1	D1	B40C1500G	PN 3220-009
5	1	F1	FUSE	PN 3602-105
6	7	LC1,LC2,LC3,LC4,LC5,LC6,LC7	ZJSR5101-	PN 3680-007
7	4	L1,L2,L3,L4	BL02RN2	PN 3680-008
8	2	L5,L6	ZBF253D	PN 3680-003
9	1	Q1	BC337	PN 3100-004
10	5	R1,R2,R3,R4,R5	1k	PN 3304-210
11	1	R6	RXE020	PN 3350-300
12	1	SW1	230V/115VS	PN 3602-104
13	1	S1	2P U-MNL	PN 3602-300
14	1	S2	7X2	PN 3502-002
15	1	S3	RS232	PN 3502-100
16	1	S4	FB-Cable	330-7029
17	1	S5	12VDC50MA	PN 3602-010
18	1	S6	PWRJACK	PN 3512-012
19	1	T1	TRAFO320	PN 3606-100

4. Repairs

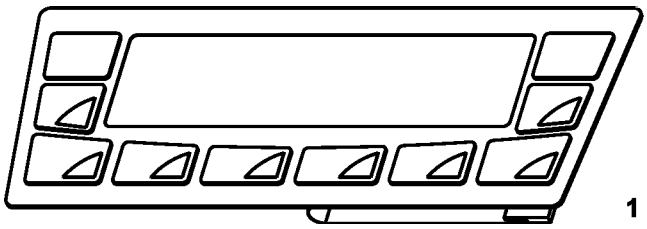
4.1 Service tools and equipment

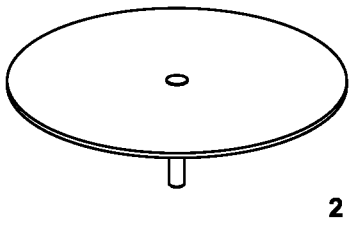
4.1.1 Equipment

The following basic tools are required:

Part-No.	Description
	Soldering iron
	Tweezers
	Lens
	Voltmeter
	Socket wrench Nos. 4, 5.5 and 7
	Flat-bladed screwdriver No. 1, 2 and 4
	Phillips screwdriver Nos. 0 and 2
350-8537	Tool set series 320
350-835x	Power supply:
350-8351	CH
350-8352	Schuko
350-8353	USA
350-8354	UK
350-8355	AUS
	Weight 10g, 20g, 50g, 100g (class F1)

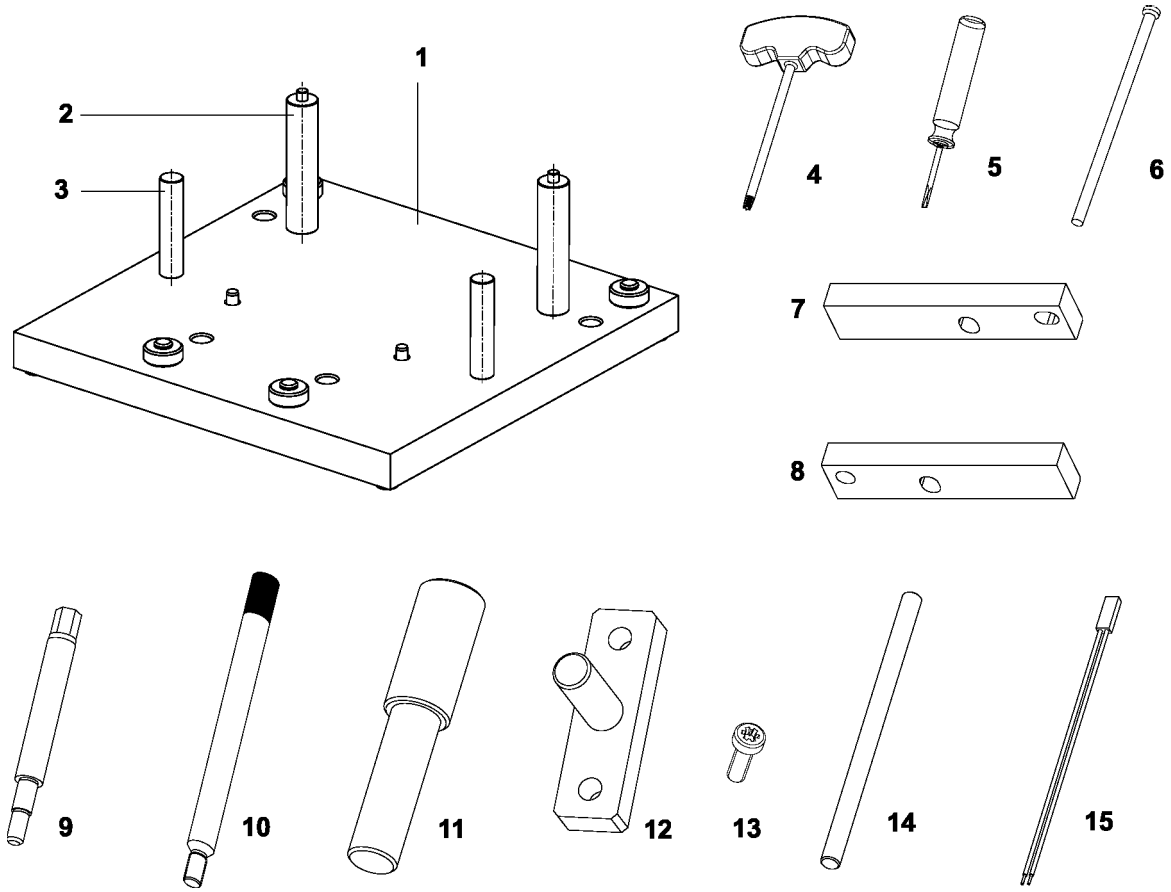
4.1.2 Adjustment set (350-8571)





Position	Part-No.	Description	Quantity
1	330-7038	Service membrane switches	1
2	W 41-1716	Service weighing pan	1

4.1.3 Tool set (350-8537)



Position	Part-No.	Description	Quantity
1	W 41-1688	Mounting plate	1
2	W 41-1688-5	Support post, long	2
3	W 41-1688-6	Support post, short	2
4	350-6203	Line-head screwdriver M4	1
5	240-7124	Screwdriver, small, no.1	1
6	PW 29.43.300	Pin for flexure holder	2
7	W 41-1700	Assembly jig with slot	1
8	W 41-1701	Assembly jig with hole	1
9	W 41-1677	Assembly pin for assembly jig	4
10	W 41-1691	Centering spigot for flexures	2
11	W 41-1675	Centering spigot for the coil	1
12	W 41-1674	Flexure strap anchor	1
13	PN 1100-172	Line-head screw M4x12	2
14	W 41-1699	Alignment jig	1
15	W 41-1578-8	Connecting cable	1

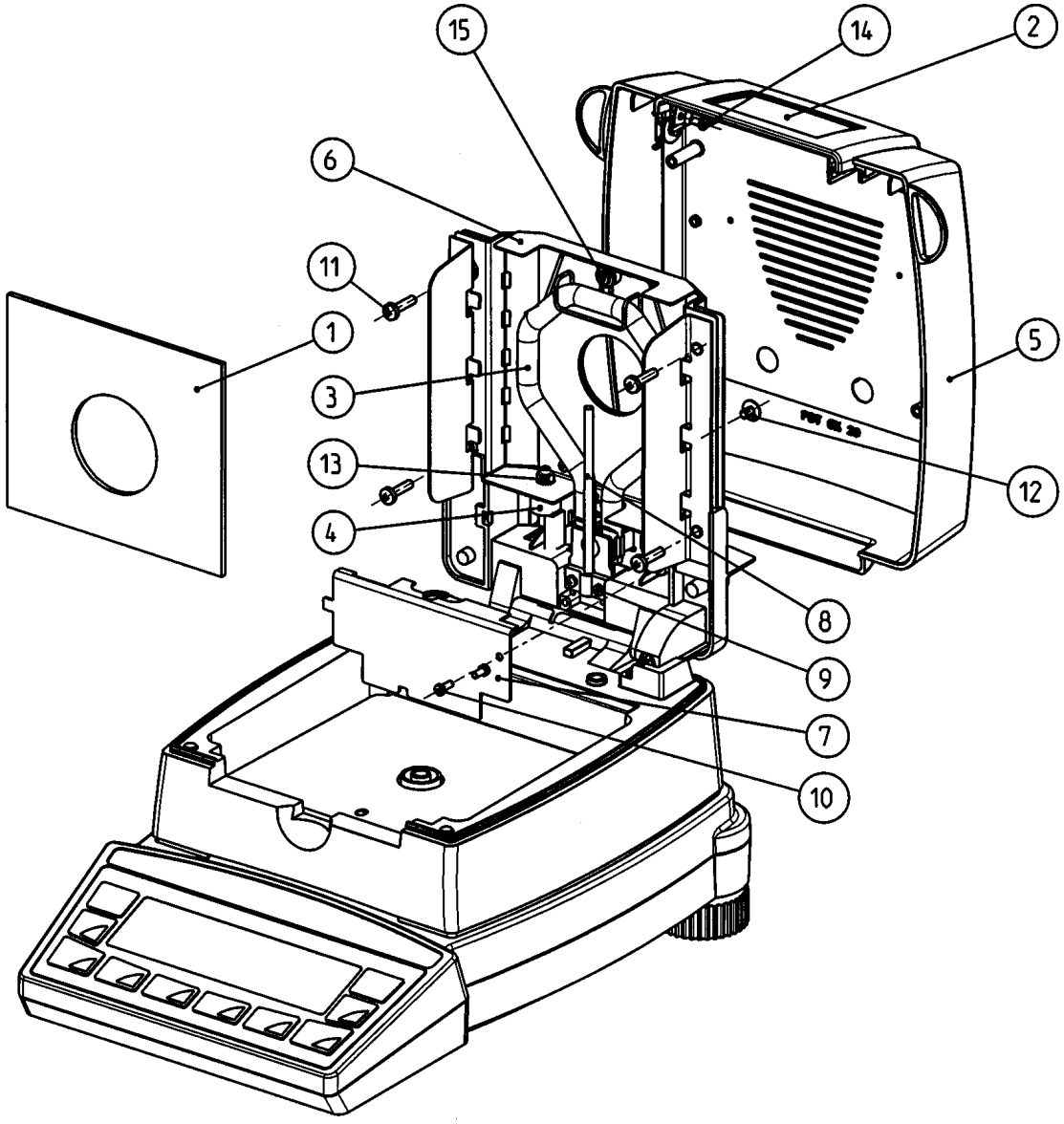
4.2 Dismantling the hood

The dismantling procedure required for replacing the parts listed below is explained in the following sections:

- Safety glass (1/4.2)
- Inspection glass (2/4.2)
- Radiator (3/4.2)
- Temperature safety switch (4/4.2)

⚠ DANGER

For maintenance-work, the device must be disconnected from the mains. Also ensure that the device cannot be reconnected to the mains by anyone else during the work.



4.2.1 Replacing or cleaning the safety class

1. **IMPORTANT**: Disconnect the device from the mains.
2. Open up the hood and remove loose parts such as the pan support, the windshield and the protection plate.
3. Undo the 4 socket head screws (11/ 4.2) on the radiator unit using a no. 2 screwdriver and remove the hood (5/4.2).
4. Undo the 2 collar screws (12/4.2) using a no. 2 screwdriver and remove the heat shield (6/4.2).
5. Slide the safety glass (1/4.2) up and out.
6. Clean or replace glass and reassemble in reverse order (Note: Orientation of glass – narrow section to bottom → see picture under section 4.2.

4.2.2 Replacing or cleaning the inspection glass

1. **IMPORTANT:** Disconnect the device from the mains.
2. Open up the hood and remove loose parts such as the pan support, the windshield and the protection plate.
3. Undo the 4 socket head screws (11/4.2) on the radiator unit using a no. 2 screwdriver and remove the hood (5/4.2).
4. Undo the 2 socket head screws (14/4.2) on the hood using a no. 0 screwdriver and remove the two inspection glasses (2/4.2).
5. Clean or replace glass and reassemble in reverse order.

4.2.3 Replacing the radiator

Note: The new radiator shell be touched only with a fibre free cloth, or gloves → soiling caused by unprotected fingers can reduce considerable life expectation of the radiator. Any soiling or dirt caused can be cleaned with methylated spirit. Attention: by cleaning the IR-radiator, do not clean the gold coating side with mehtylated spirit.

1. IMPORTANT: Disconnect the device from the mains.
2. Open up the hood and remove loose parts such as the pan support, the windshield and the protection plate.
3. Undo the 4 socket head screws (11/4.2) on the radiator unit using a no. 2 screwdriver and remove the hood (5/4.2).
4. Undo the 2 collar screws (12/4.2) using a no. 2 screwdriver and remove the heat shield (6/4.2).
5. Slide the safety glass (1/4.2) up and out.
6. Undo socket head screw (10/4.2) using a no. 0 screwdriver and remove the cover (7/4.2).
7. Undo 2 socket head screws (9/4.2) using a no. 0 screwdriver and fold back the temperature. sensor (8/4.2) and holder.
8. Undo socket head screw (15/4.2) and remove securing clip.
9. Disconnect the radiator's 2 plug-in contacts from connectors on topside of unit.
10. Grasp radiator at top and pull slightly forward while gently spreading retaining clip. Pull radiator (3/4.2) out gently.
11. Replace radiator and reassemble in reverse order.

4.2.4 Replacing the temperature safety switch

1. **IMPROTANT:** Disconnect the device from the mains.
2. Open up the hood and remove loose parts such as the pan support, the windshield and the protection plate.
3. Undo the 4 socket head screws (12/4.2) using a no. 2 screwdriver and remove the hood (5/4.2).
4. Undo the 2 collar screws (12/4.2) using a no. 2 screwdriver and remove the heat shield (6/4.2).
5. Slide the safety glass (1/4.2) up and out.
6. Undo socket head screw (10/4.2) using a no. 0 screwdriver and remove the cover (7/4.2).
7. Disconnect the temperature safety switch's 2 plug-in contacts.
8. Undo the hexagon nut (13/4.2) using the no. 7 socket wrench and remove the temperature safety switch (4/4.2).
9. Replace switch and reassemble in reverse order.

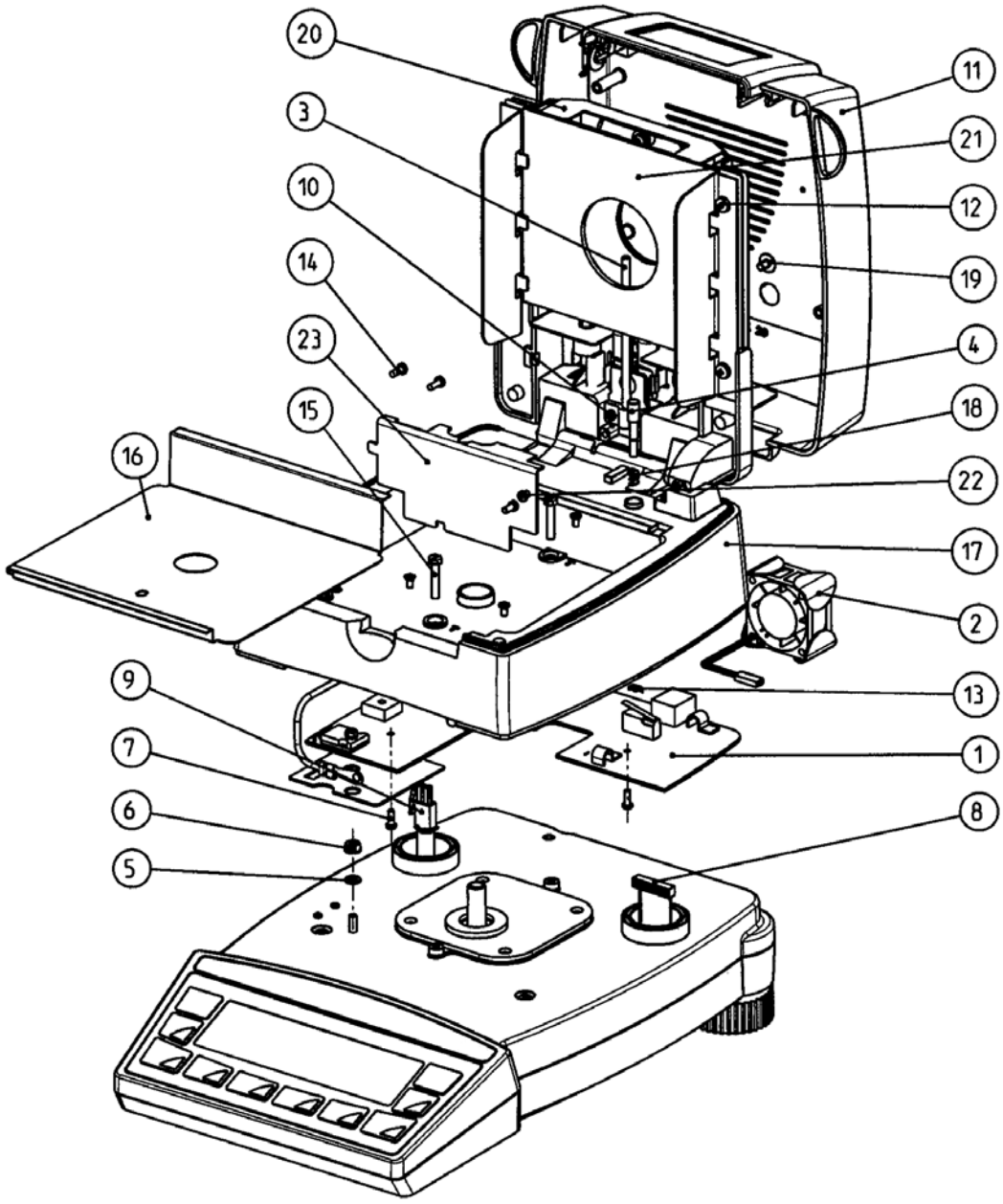
4.3 Dismantling the top of moisture analyzer

The dismantling procedure required for replacing the parts listed below is explained in the following sections:

- Heating board (1/4.3)
- Fan (2/4.3)
- Temperature sensor (3/4.3)
- Plunger (4/4.3)

⚠ DANGER

For maintenance-work, the device must be disconnected from the mains. Also ensure that the device cannot be reconnected to the mains by anyone else during the work.



4.3.1 Replacing the heating board

1. **IMPORTANT:** Disconnect the device from the mains.
2. Open up the hood and remove loose parts such as the pan support, the windshield and the protection plate (16/4.3).
3. Undo the 2 socket head screws (15/4.3 / marked т on the housing) using a no. 4 screwdriver and gently tip the top of the moisture analyzer (17/4.3) back.
4. Disconnect the ribbon cable (8/4.3) and power lead (9/4.3) from the heating board and remove the top of the moisture analyzer from the balance.
5. Undo the ground wire's hexagon nut (6/4.3) using the no. 7 socket wrench from the top of the balance; make sure to leave the lock washer (5/4.3) on the top of the balance.
6. Undo 2 socket head screws (7/4.3) from the heating board using the no. 0 screwdriver and 2 socket head screws (14/4.3) from the mains socket (rear panel) using the no. 2 screwdriver.
7. Disconnect the plug-in contacts for the temperature sensor, radiator power supply and fan from the heating board and remove the heating board (1/4.3).
8. Replace board and reassemble in reverse order.

4.3.2 Replacing the fan

1. **IMPORTANT:** Disconnect the device from the mains.
2. Open up the hood and remove loose parts such as the pan support, the windshield and the protection plate (16/4.3).
3. Undo the 2 socket head screws (15/4.3 / marked т on the housing) using a no. 4 screwdriver and gently tip the top of the moisture analyzer (17/4.3) back.
4. Disconnect the ribbon cable (8/4.3) and power lead (9/4.3) from the heating board (1/4.3) and remove the top of the moisture analyzer from the balance.
5. Undo the ground wire's hexagon nut (6/4.3) using the no. 7 socket wrench from the top of the balance; make sure to leave the lock washer (5/4.3) on the top of the balance.
6. Undo 2 socket head screws (7/4.3) from the heating board using the no. 0 screwdriver and 2 socket head screws (14/4.3) from the mains socket (rear panel) using the no. 2 screwdriver.
7. Disconnect the plug-in contacts for the temperature sensor, radiator power supply and fan from the heating board and remove the heating board.
8. Remove the fan (2/4.3).
9. Replace fan and reassemble in reverse order.

4.3.3 Replacing the temperature sensor

1. **IMPORTANT:** Disconnect the device from the mains.
2. Open up the hood and remove loose parts such as the pan support, the windshield and the protection plate (16/4.3).
3. Undo the 2 socket head screws (15/4.3 / marked т on the housing) using a no. 4 screwdriver and gently tip the top of the moisture analyzer (17/4.3) back.
4. Disconnect the ribbon cable (8/4.3) and power lead (9/4.3) from the heating board (1/4.3) and remove the top of the moisture analyzer from the balance.

5. Undo the ground wire's hexagon nut (6/4.3) using the no. 7 socket wrench from the top of the balance; make sure to leave the lock washer (5/4.3) on the top of the balance.
6. Undo 2 socket head screws (7/4.3) from the heating board using the no. 0 screwdriver and 2 socket head screws (14/4.3) from the mains socket (rear panel) using the no. 2 screwdriver.
7. Disconnect the plug-in contacts for the temperature sensor, radiator power supply and fan from the heating board and remove the heating board.
8. Undo the 4 socket head screws (12/4.3) on the radiator unit using a no. 2 screwdriver and remove the hood (11/4.3).
9. Undo the 2 collar screws (19/4.3) using a no. 2 screwdriver and remove the heat shield (20/4.3).
10. Slide the safety glass (21/4.3) up and out.
11. Remove the harness wrap from the cable gland on the radiator unit.
12. Undo socket head screw (22/4.3) using a no. 0 screwdriver and remove the cover (23/4.3). 13. Undo 2 socket head screws (10/4.3) using a no. 0 screwdriver and remove the temperature sensor (3/4.3).

Note: When the temperature sensor is replaced, the temperature needs to be adjusted using calibration set MRS-A01 → Instructions see “Temperature linearization” in chapter 4.10.10.

4.3.4 Replacing or cleaning the plunger

1. **IMPORTANT:** Disconnect the device from the mains.
2. Open up the hood and remove loose parts such as the pan support, the windshield and the protection plate (16/4.3).
3. Undo 2 socket head screws (15/4.3) using a no. 4 screwdriver and tip the temperature sensor (17/4.3) back slightly.
4. Disconnect the ribbon cable (8/4.3) and power lead (9/4.3) from the heating board (1/4.3) and remove the top of the moisture analyzer from the balance.
5. Undo the ground wire’s hexagon nut (6/4.3) using the no. 7 socket wrench from the top of the balance; make sure to leave the lock washer (5/4.3) on the top of the balance.
6. Undo 2 socket head screws (7/4.3) from the heating board using the no. 0 screwdriver and 2 socket head screws (14/4.3) from the mains socket (rear panel) use the no. 2 screwdriver.
7. Disconnect the plug-in contacts for the temperature sensor, radiator power supply and fan from the heating board and remove the heating board.
8. Take off the lock washer (13/4.3) and remove the plunger (4/4.3) and spring (18/4.3).
9. Clean or replace plunger and reassemble in reverse order.

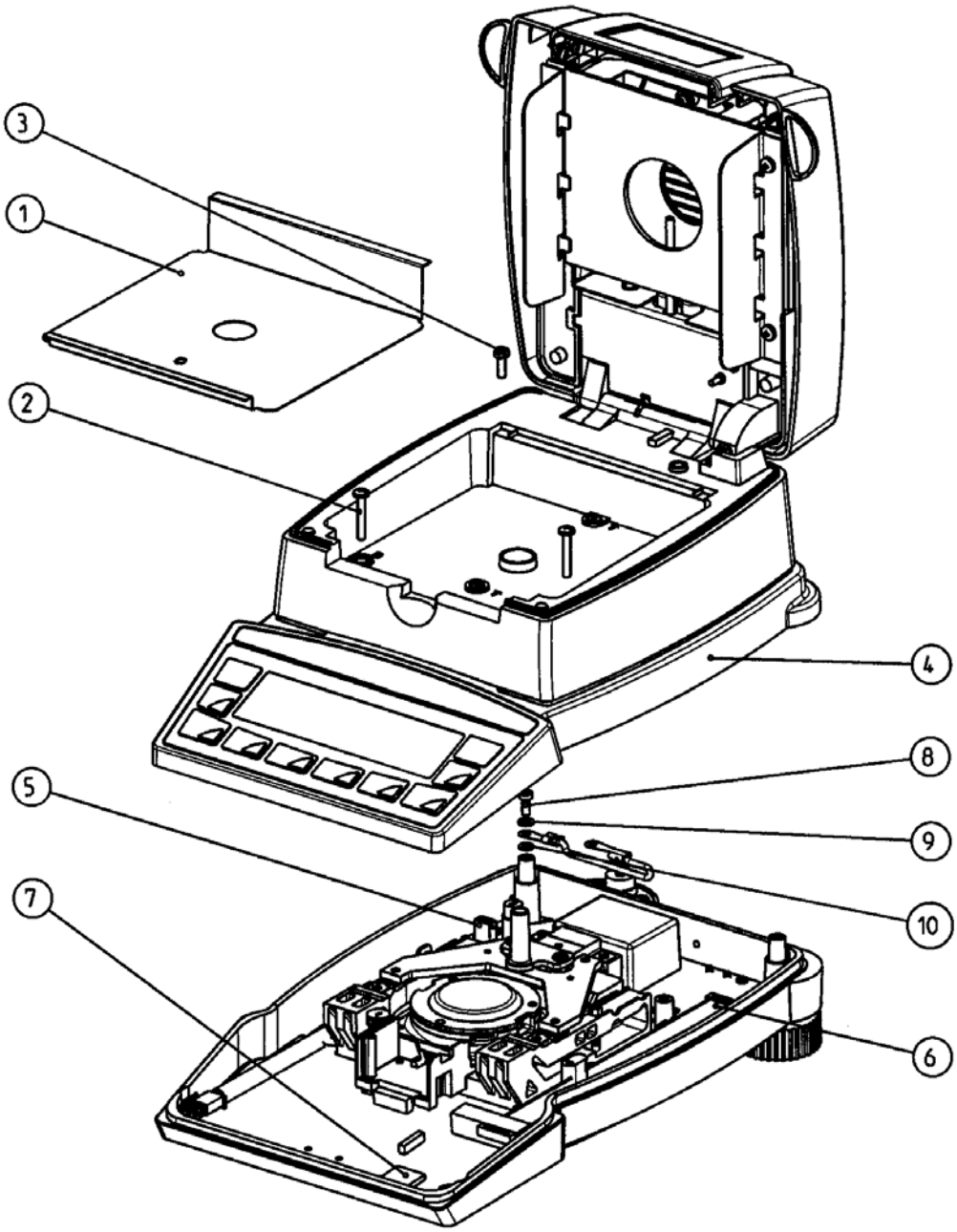
4.4 Dismantling the top of balance

The dismantling procedure required for replacing or repairing the parts listed below is explained in the following section:

- Main board (14/4.4)
- Power supply (13/4.4)
- Weighing cell (2.6)
- Display board (7/4.4)

⚠ DANGER

For maintenance-work, the device must be disconnected from the mains. Also ensure that the device cannot be reconnected to the mains by anyone else during the work.



4.4.1 General procedure for opening the balance

1. **IMPORTANT:** Disconnect the device from the mains.
2. Open up the hood and remove loose parts such as the pan support, the windshield and the protection plate (1/4.4).
3. Undo 2 socket head screws (2/4.4 / marked **B** on the housing) and rear case securing screw (3/4.4) using a no. 4 screwdriver.

CAUTION: Take care not to damage the sensitive weighing cell during the following stages of the procedure:

4. Raise the top of the balance (4/4.4) slightly; disconnect the ribbon cable (6/4.4) from the power supply board. The connector between the membrane switches and the main board (7/4.4) must also be detached.
5. Carefully tilt the top of balance to the left alongside the balance.

Note: The balance is now ready to be adjusted → see “Adjustments” in chapter 4.10. For dismantling the weighing cell (see “Dismantling the weighing cell” on page 4.6) you need to do the following steps:

6. Remove cylinder screw (8/4.4) with a line-head screwdriver [4/4.1.3] and the earth cable with the washers (9+10/4.4).
7. **MRS 120-3:** Disconnect the power cable from the power supply board (5/4.4) and remove the top of balance.
8. The bottom of balance is now ready for further dismantling, see the following pages.

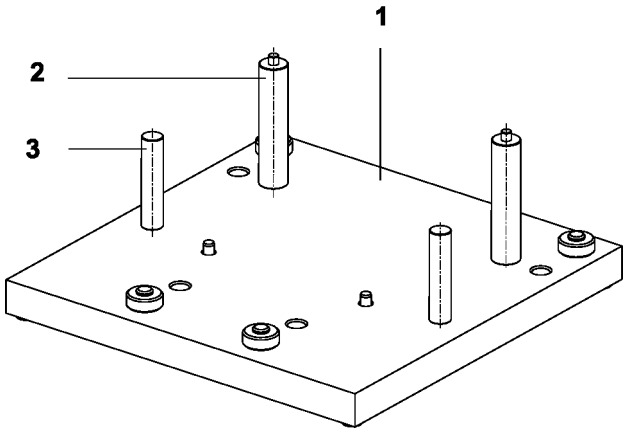
4.5 Introduction / Preparation of the balance

4.5.1 Introduction

In the event of a broken flexure, it is recommended that **all** flexures be replaced. The following assembly instructions provide information on how the flexures can be replaced most efficiently. It is important to employ a structured procedure for dismantling since it is essential to replace the **same parts** (particularly screws) **in the same place** when re-assembling.
The various items of the assembly instructions mean:
Component items.
[5/4.1]: Tooling items see “Service tools and equipment” in chapter 4.1.
Example: 3 nuts (24/2.6) means 3 nuts as Item 26 in chapter 2.6.

4.5.2 Preparation of the tools

Before dismantling the balance it is necessary to carry out some preparation of the tools. 2 long [2/4.1.3] and 2 short [3/4.1.3] support posts must be screwed into the correct places on the assembly plate [1/4.1.3] → see the drawing below and in chapter 4.1.3.
The soldering iron should be plugged in or preheated.



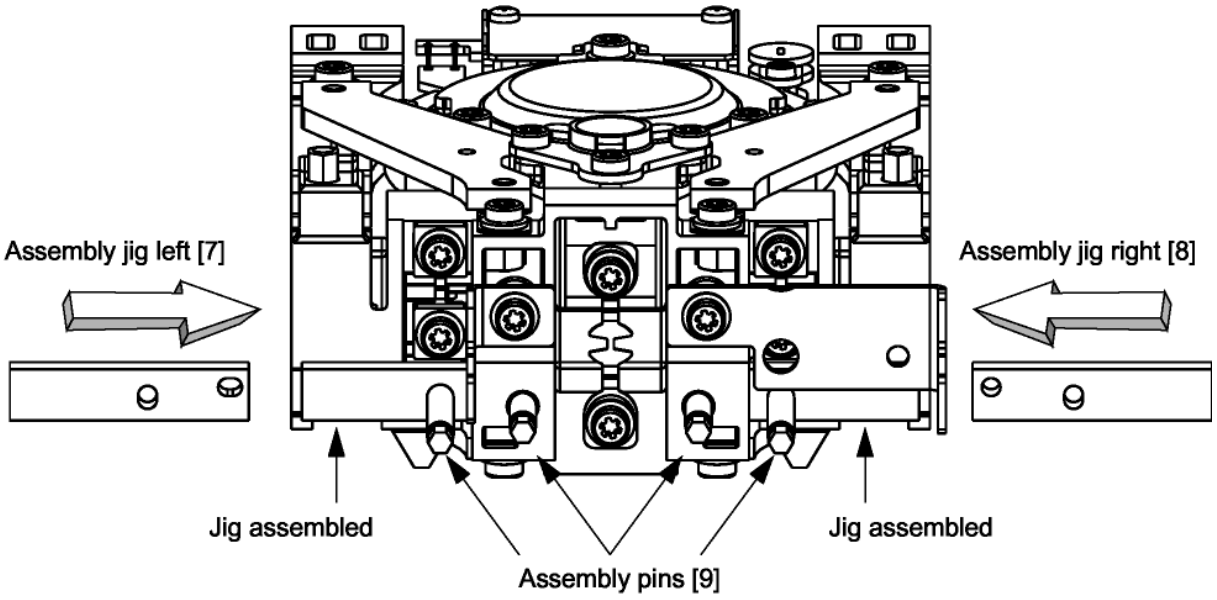
4.6 Dismantling the weighing cell

4.6.1 Removing the top of balance

1. → see “Dismantling the top of balance” in chapter 4.4.

4.6.2 Removing the weighing cell from the bottom of balance

1. On the main board, unplug the sensor mechanism plug (12/2.6) using a small screwdriver.
2. Turn over the bottom of balance and unscrew the 3 nuts (24/2.6) on the underside of the housing.
3. Hold the weighing cell **only** on the chassis and lift it out of the bottom of housing.
4. The chassis can now be placed on the assembly plate for easier handling.
5. To protect the weighing cell, the two assembly jigs [7/4.1.3] + [8/4.1.3] are introduced in accordance with the drawing see drawing in chapter 4.6.2 and secured with the 4 assembly pins [9/4.1.3].
6. Assemble the two assembly jigs [7] + [8] and 4 assembly pins [9] in accordance with the drawing in chapter 4.6.2.



4.6.3 Removing the flexure strap

1. Undo 2 screws (23/2.6), remove flexure strap (3/2.6) incl. bases (9/2.6) and spring washers (26/2.6) → do not separate screw components, assemble in same relationship!
2. Screw the flexure strap anchor [12/4.1.3] on tightly with 2 screws [13/4.1.3] in place of the flexure strap.

4.6.4 Removing the two flexure holders

1. Using the two pins for flexure holder [6/4.1.3] fix the upper flexure holder (2/2.6) into the chassis.
2. Unscrew the 4 screws (22/2.6) of the upper flexure holder and remove together with the 4 spring washers (26/2.6) → 2 on the chassis, 2 on the support piece.
3. Remove the two pins with the upper flexure holder incl. 4 spring washers and the flexure sheets, then take out the pins from the flexure holder.
4. Fix the lower flexure holder (2/2.6) into the chassis with the two pins for flexure holder [6/4.1.3]. 5. Unscrew 4 screws (22/2.6) from the lower flexure holder and remove together with the 4 spring washers → 2 on the chassis, 2 on the support piece.
6. Take out both pins with the lower flexure holder and remove the lower flexure holder together with the 4 spring washers and the flexure sheets.

4.6.5 Removing coil

1. Carefully unsolder 2 connecting wires (1/2.6) from the connecting board (14/2.6) using the tweezers.
2. Unscrew 3 screws (21/2.6) from the magnet cover (8/2.6), remove the cover together with transport safety device (4/2.6) and spring washer (s26/2.6).
3. Unscrew 2 brass screws (19/2.6) from the coil (11/2.6) on the balance arm (16/2.6) using a No.2 screwdriver, remove the coil together with the washer (25/2.6).
4. Carefully take out the coil from the magnet (32/2.6).

4.6.6 Removing the support piece

1. Unscrew 2 screws (21/2.6) on the inner cone (17/2.6) and remove inner cone.
2. Unscrew upper screw (balance arm side) of the flexure strap anchor [12/4.1.3] and pull off the support piece together with the flexure strap anchor over the assembly pins [9/4.1.3].

4.6.7 Removing the balance arm

1. Unscrew brass screw (28/2.6) from the stopper (27/2.6), turn the stopper inwards ca. 90° and gently re-tighten the brass screw.
2. Unscrew the 4 screws (23/2.6) from the flexure sheets (6/2.6) and remove both flexure sheets together with the bases (9/2.6) and spring washers (26/2.6).

Note: Since the lug of the sensor mechanism is firmly attached to the balance arm, the sensor mechanism must be unscrewed to dismantle the balance arm and gently tilted back:

3. Unscrew 2 screws (18/2.6) from the sensor mechanism plate (5/2.6) and remove the plate.
4. Unscrew screw (18/2.6) from the connecting board (14/2.6).
5. Unscrew 2 screws (20/2.6) of the sensor mechanism and gently tilt the sensor mechanism to the rear.
6. Remove the two inner assembly pins [9/4.1.3] → unscrew from the balance arm.

7. Remove the two outer assembly pins [9/4.1.3] → unscrew from the chassis.
8. Remove the two assembly jigs [7/4.1.3] + [8/4.1.3].
9. Carefully tilt the balance arm (16/2.6) over the magnet (32/2.6) and the sensor mechanism and take out.
10. Further dismantling of the weighing cell is unnecessary.

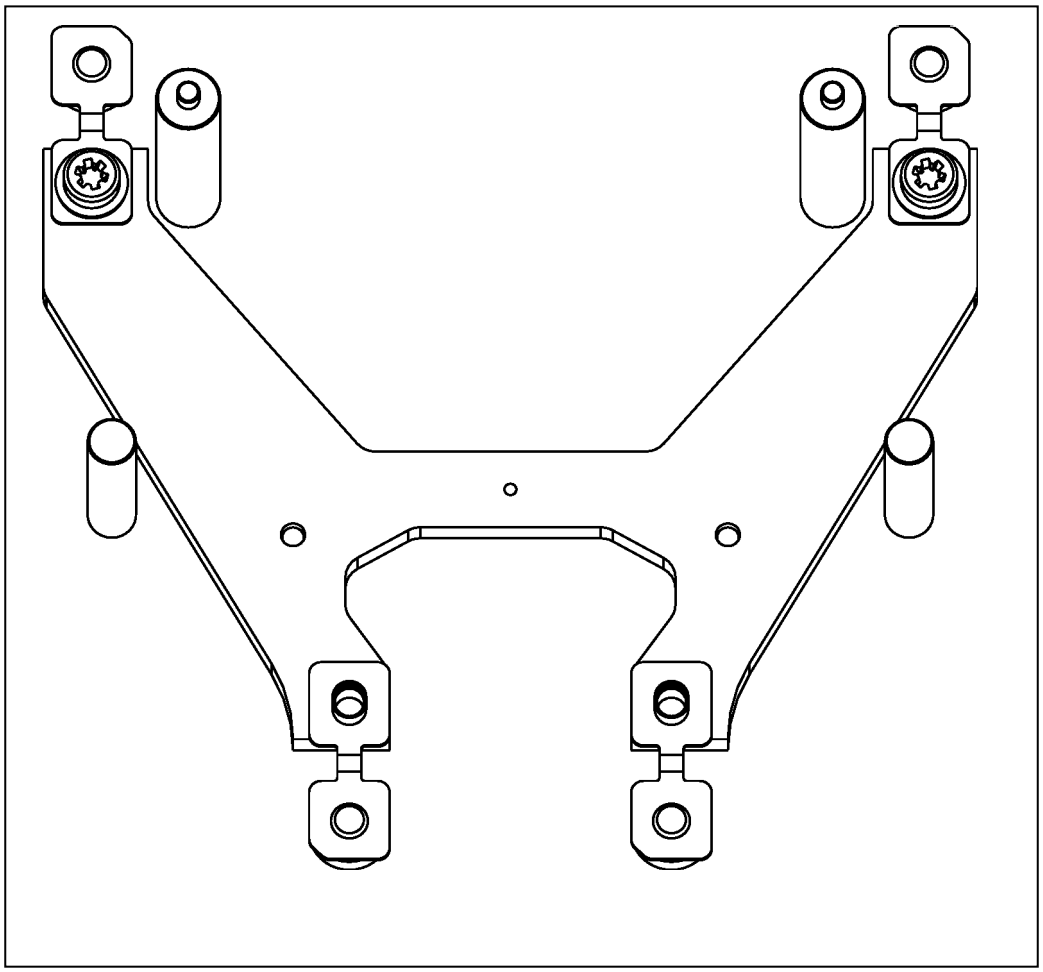
4.7 Installing the new flexure sheets

4.7.1 Removing the old flexure sheets

1. Take out all screws from the flexure holder and remove the old flexure sheets together with spring washers.

4.7.2 Installing the new flexure sheets

1. Place a flexure holder on the assembly plate [1/4.1.3] as in the drawing below.
2. Place 4 new flexure sheets (7/2.6) part-no. 320-2045 carefully on the assembly plate as in the drawing below → the slot of the sheet is always on the flexure holder.
3. Place 4 spring washers (26/2.6) on the flexure sheet and screw these tightly to the flexure holder with 4 screws (20/2.6).
4. Take the complete flexure holder carefully off the assembly plate → do not touch the flexures!
5. Prepare the second flexure holder in the same way.



4.8 Cleaning

4.8.1 Cleaning the magnet

1. Cut strips of a double-sided adhesive tape (ca. 2x2 cm).
2. Wind the adhesive tape around one end of a toothpick.
3. Introduce the toothpick, adhesive tape first, vertically into the annular gap.
4. With circular movements move it repeatedly around the magnet. In this way any dirt particles stick to the adhesive tape.
5. If necessary, repeat the procedure with a freshly prepared toothpick until the annular gap is free from impurities.
6. Wipe over the top of magnet with a piece of adhesive tape.

4.8.2 Cleaning the coil

1. Using a lint-free cloth, remove any contamination from the coil.
2. Do not clean the coil with adhesive tape; risk of injury!

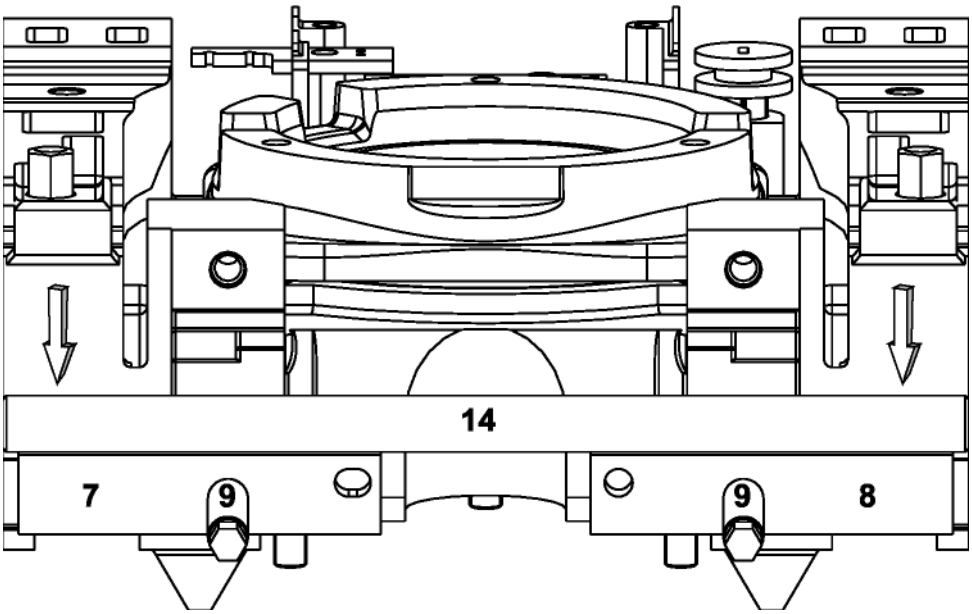
4.8.3 Final check of cleaning

1. Visually inspect the annular gap and the coil for any contamination and clean if necessary.

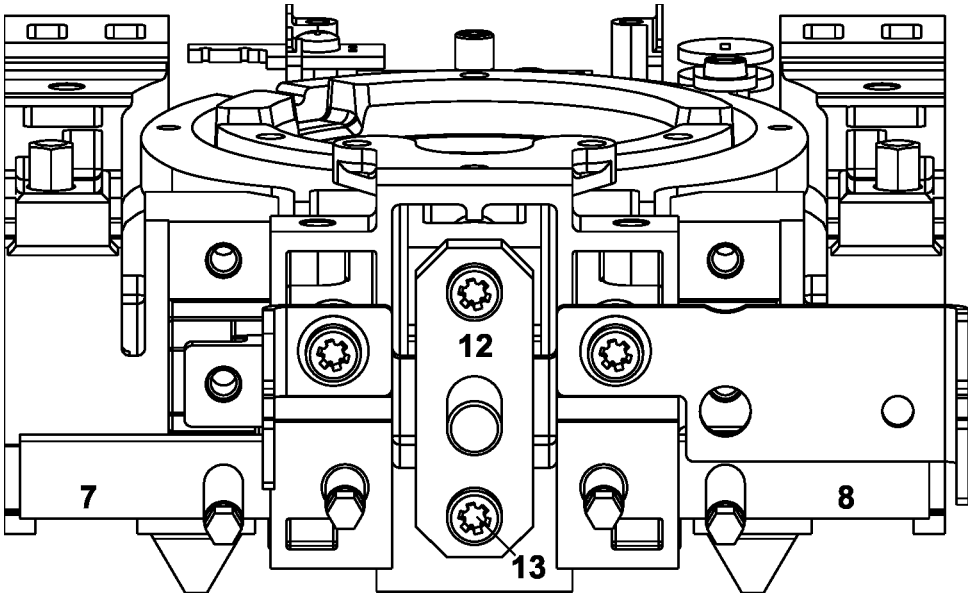
4.9 Assembling the weighing cell

4.9.1 Assembling the balance arm and the support piece

1. To facilitate the assembly, the chassis can be placed on the assembly plate → attention to the sensor mechanism!
2. Pre-assemble assembly jigs [7] + [8] with 2 assembly pins [9] on the chassis as in the drawing below.
3. Adjust assembly jigs [7] + [8] using the alignment jig [14] horizontally in accordance with the drawing below and tighten the two assembly pins [9] with a No. 4 socket wrench.



4. Carefully introduce the balance arm (16/2.6) over the magnet (32/2.6) and past it to the sensor mechanism.
5. Assemble the balance arm with 2 assembly pins [9] loosely behind the assembly jigs. The balance arm must remain moveable.
6. Introduce the pre-assemble support piece (10/2.6) over the two inner assembly posts [9] → see the drawing on page 60.
7. It must be possible to push the support piece smoothly over the two assembly pins.
8. Locate the support piece and the balance arm using the flexure strap anchor [12] and the two screws [13] → see the drawing on page 60.
9. The right inner assembly pin of the assembly jig [8] can now be firmly tightened.
10. The left inner assembly pin of the assembly jig [7] can now be firmly tightened.
11. Firmly tighten the two screws [13] of the fixed flexure strap anchor [12].
12. The support piece and the balance arm are now fixed.



4.9.2 Assembling the coil, the magnet cover and the transport safety device

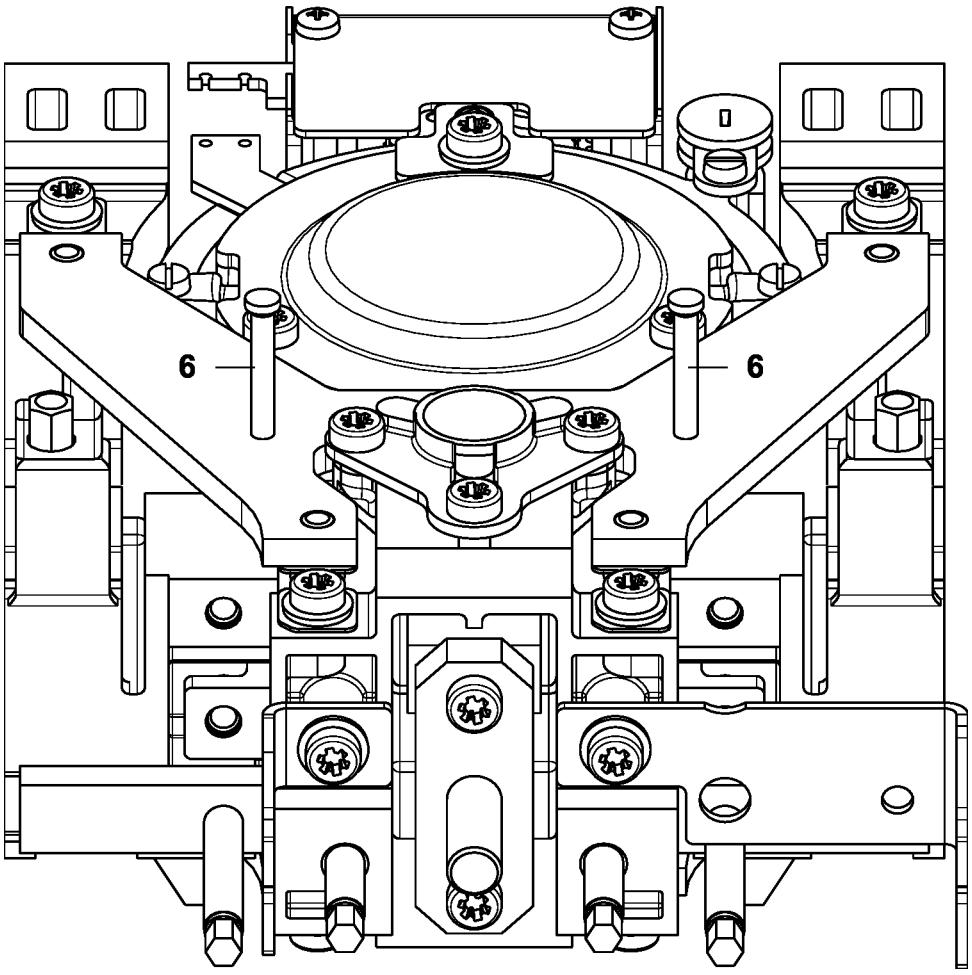
1. Place the coil onto the balance arm and centre with the centering spigot [11/4.1.3].
2. Screw the coil tightly onto the balance arm with 2 brass screws (19/2.6) and 2 washers (25/2.6).
3. The coil must be centered in such a way that the centering spigot can be removed smoothly.
4. Pre-assemble the magnet cover (8/2.6) with 2 screws (21/2.6) → screws left and right.
5. Pre-assemble the transport safety device (4/2.6) with the third screw (21/2.6) and spring washer (26/2.6) → gently tighten.
6. Adjust the transport safety device in the balance arm in such a way that the transport safety device does not touch the balance arm and a uniform annular gap is formed → visual check with the lens.

4.9.3 Assembling the sensor mechanism, the inner cone and the stopper

1. Press the sensor mechanism carefully into the cutout in the chassis in the direction of the magnet and secure to the chassis with 2 screws (20/2.6).
2. Firmly screw the connecting board (14/2.6) onto the chassis with screw (18/2.6). 3. Fix the sensor mechanism plate (5/2.6) with 2 screws (18/2.6) to the chassis.
4. Solder the two connecting wires (1/2.6) in parallel and strain-free to the connecting board (14/2.6).
5. Assemble the inner cone (17/2.6) to the support piece with 2 screws (21/2.6).
6. Turn back the stopper (27/2.6) with brass screw (28/2.6) by 90° and screw tight.
7. The stopper must be free of play and lie centrally in the symmetry screw (30/2.6) → if necessary, re-adjust symmetry screw.

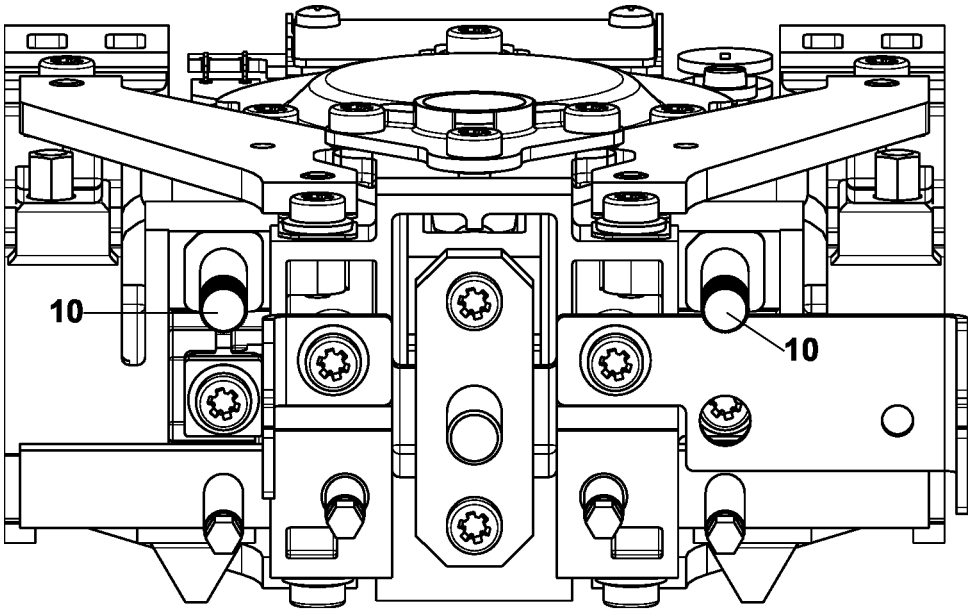
4.9.4 Assembling the flexure holders

1. Introduce the two pins for flexure holder [6] in the first pre-assembled flexure holder (see “Installing the new flexure sheets” in chapter 4.7.2) in such a way that the shoulder of the pins is opposite the screw heads on the flexure holder.
2. Bring the two pins with the flexure holder into position in the chassis → see drawing below.
3. Lower the flexure holder carefully over the two pins on the chassis, until the flexure sheets just touches the chassis and the support piece.
4. Secure the flexure holder with 4 screws (22/2.6) and 4 spring washers (26/2.6).
5. Push through the two pins up to the installed flexure holder.
6. On the opposite side introduce the second pre-assembled flexure holder (see “Installing the new flexure sheets” in chapter 4.7) with the screw heads inwards over the two pins and lower onto the chassis, until the flexure sheets just touches the chassis and the support piece.
7. Secure the flexure holder with 4 screws (22/2.6) and 4 spring washers (26/2.6).
8. The two pins must be capable of being withdrawn smoothly from the flexure holder.



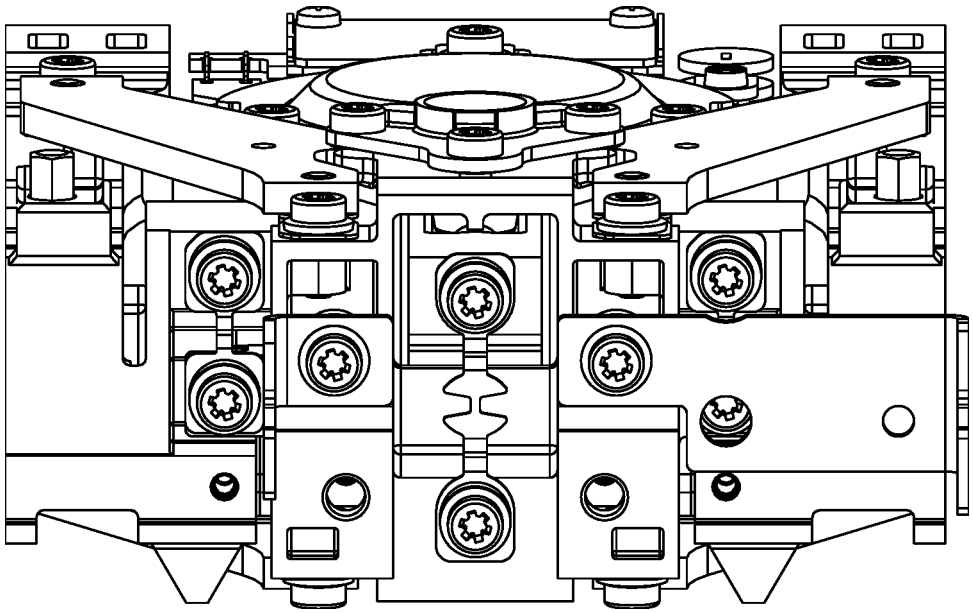
4.9.5 Assembling new flexure sheets

1. Bring 2 flexure sheet (6/2.6) part-no. 320-2041 into position as in the drawing below → slots are on the support piece side (below).
2. With a centering spigot [10], centre the flexure sheet in the hole on the chassis side (above).
3. With the second centering spigot [10], centre the flexure sheet in the slot on the support piece side (below).
4. Tighten the first (upper) centering spigot and then remove the second (lower) centering spigot, without touching the flexure sheet in doing so.
5. Fasten the flexure sheet on the support piece side with base (9/2.6), spring washer (26/2.6) and screw (23/2.6) → see drawing below.
6. Remove the second (upper) centering spigot and fasten the flexure sheet on the chassis side with base (9/2.6), spring washer (26/2.6) and screw (23/2.6).



4.9.6 Assembling a new flexure strap

1. Unscrew 2 screws [13] on the flexure strap anchor [12] and remove it.
2. Bring the flexure strap (3/2.6) part-no. 320-2021 into position as shown in the drawing on page 63 → the slot is on the support piece side.
3. Using a centering spigot [10], centre the flexure strap in the hole on the balance arm side.
4. With the second centering spigot [10] centre the flexure strap in the slot on the support piece side.
5. Tighten the first (upper) centering spigot and then carefully remove the second (lower) centering spigot, without touching the flexure strap.
6. Fasten the flexure strap on the support piece side with base (9/2.6), spring washer (26/2.6) and screw (23/2.6) → see the drawing on page 63.
7. Remove the second (upper) centering spigot and fasten the flexure strap on the balance arm side with base (9/2.6), spring washer (26/2.6) and screw (23/2.6).



4.9.7 Dismantling the assembly jigs

1. Unscrew and remove the two inner assembly pins [9] on the support piece.
2. Unscrew and remove the two outer assembly pins [9] on the support piece.
3. Take out the two assembly jigs [7] + [8] from the side.
4. If the two assembly pins [6] on the flexure holder (2/2.6) are still assembled, remove them carefully.

4.9.8 Installing the weighing cell in the bottom of balance

1. Carry out a further movement check on the balance arm → the balance arm must not touch the transport safety device (4/2.6)! Visual check with the lens.
2. Place the weighing cell carefully in the bottom of housing → hold the weighing cell only to the chassis.
3. Tilt the bottom of housing to the side and screw the weighing cell securely from below with 3 nuts (24/2.6).
4. Carefully connect the sensor mechanism plug (12/2.6) to the main board (8/2.1).
5. Lay the top of balance (4/4.4) on the left beside the bottom of balance and connect the internal power supply cable (5/4.4) on the connector board

IMPORTANT: Tighten earth cable with cylinder-head screw (8/4.4) incl. washers (9+10/4.4) on the bottom of balance.

6. The balance is now ready for the adjustments explained on the following pages.

4.10 Adjustments

4.10.1 Activation of the service mode

1. Push and hold simultaneously the TARE- and PRINT-key for approx. 10 sec. whilst switching on the balance after connected the power cable. As soon „SET SERVICE MODE“ appears in the display, then release the two keys.
2. Push the CHANGE-key . „CODE 0“ appears in the display.
3. Press ENTER-key. „CODE 0000“ appears in the display.
4. With the arrow keys insert the code „**5236**“ and confirm with the ENTER-key.
5. The balance is now in service mode.

4.10.2 Adjusting of the symmetry

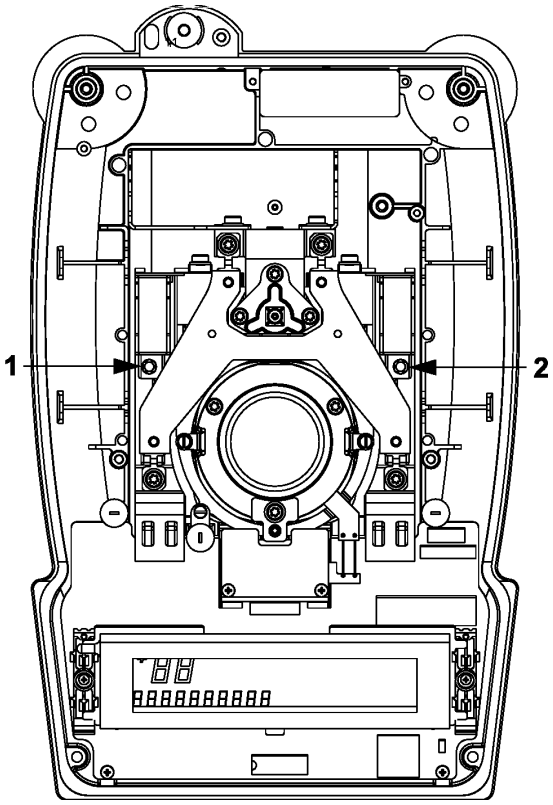
1. Connect the connecting cable [15/4.1.3] from the tool set to plug (S3/4.10.1.1) on the main board. 2. Connect the voltmeter to the connecting cable.
3. The voltmeter must show approximately the **same voltage** in the end positions of the balance arm (one positive, one negative).
4. If the difference is too great, the position of the balance arm can be adjusted with the symmetry screw.
5. Detach connecting cable and voltmeter from the balance.

4.10.3 Checking the pre-load

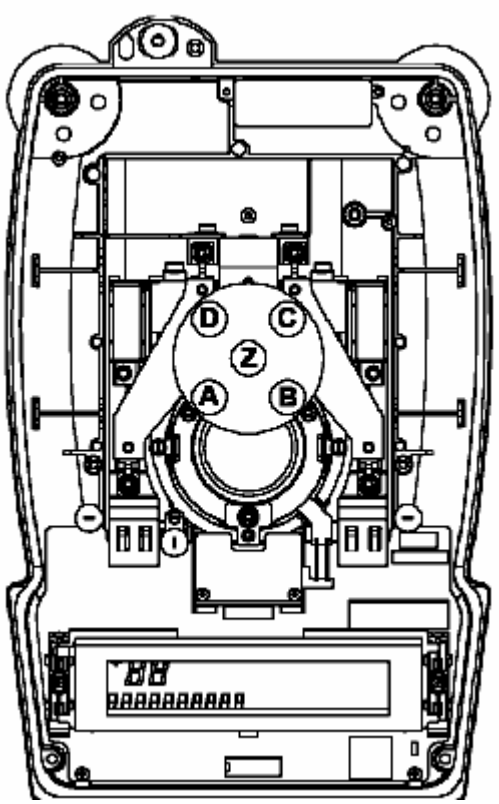
1. The pre-load error ERROR 60 (below minimal converter range) must not appear when the service weighing pan is in position **without load.**
2. The pre-load error ERROR 61 (above maximal converter range) must not appear when the service weighing pan is in position with **full load.**
3. If an ERROR is displayed, the symmetry must be re-adjusted and the transport safety device adjusted from the start → see “Assembling the coil, the magnet cover and the transport safety device” in chapter 4.9.2.

4.10.4 Adjusting of the corner load

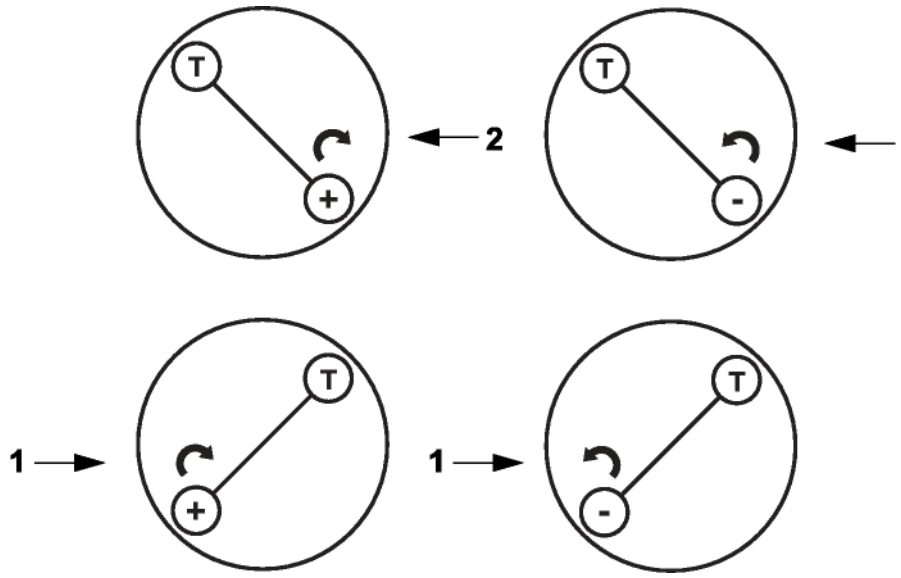
1. Place the service weighing pan [3/4.1.2] on the balance.
2. Tare the balance with the TARE-key.
3. Check with a test weight for corner load → see “Final check” in chapter 4.10.12 the deviation between the two diagonals A-C and B-D → see next page. The diagonal with the **larger absolute deviation** should be adjusted first.
4. Adjustment of the corner load is effected by turning the screws (1 + 2) in the direction of the arrow.



Example of corner load adjustment:



1. The diagonal A-C has the larger difference.
2. Place a test weight at point C of the weighing pan. Tare the balance using the TARE-key.
3. Move the weight to point A.
4. There is a difference of 12 digits between points A and C (A=12, C=Tare=0).
5. The displayed value for point A is reduced by turning the corner load screw 1 above point A in a clockwise direction → the difference between A-C becomes smaller.
6. There is a difference of 7 digits between points B and D (B=-7, D=Tare=0).
7. The displayed value for point B is reduced by turning the corner load screw 2 above point B in an anti-clockwise direction →the difference between B-D becomes smaller.
8. The diagonals A-C and B-D should be repeatedly adjusted until the two diagonals have reached the permitted tolerances for corner load → see “Final check” in chapter 4.10.12.
9. Place a test weight on point Z of the weighing pan, tare balance using the TARE-key. 10. Check the points A-B-C-D against the permitted tolerances and correct if necessary.



4.10.5 Final assembly of the balance

1. Disconnect the balance from the mains, pull out the mains cable or power supply. If a power supply has been used, re-attach the cover (9/2.1).
2. The service weighing pan [3/4.1.2] and the service membrane switches [2/4.1.2] must be removed from the balance.
3. Reconnect the ribbon cable to the power supply board. Reconnect the ribbon cable of the membrane switches to the main board (D1/4.10.1.1).
4. **IMPORTANT:** Screw up the ground wire on the bottom of balance.
5. Check: ensure that the power supply cable (5/4.4) is connected to the power supply board.
6. **CAUTION:** Pay attention that during the following operating sequence the weighing cell will not be damaged and no cable will be caught.
7. Place the two parts of the housing together and fasten with 3 screws.
8. Protection plate, windshield and pan support must be inserted.
9. The balance must have attained its operating temperature before further adjustment can be carried out.

4.10.6 Checking the corner load

1. The balance must have reached its operating temperature.
2. Check the corner load tolerance → see “Adjusting of the corner load” in chapter 4.10.4.

4.10.7 Linearization of the balance

1. The balance must have reached its operating temperature and be in the service mode → see “Activation of the service mode” (chapter 4.10.1)
2. Have weights of 1/2 full load and full load ready → see “Final check” in chapter 4.10.12.
3. Press and hold CHANGE-key until "LINEARITY" appears on the info display, then release the key.
4. With empty service weighing pan [3/4.1.2] press the function-key F1 "0" → balance will flash on.
5. Place a 1/2 full load weight in the centre of the weighing pan.
6. Press the function-key F2 "1/2" → balance will flash on. 7. Place a full load weight in the centre of the weighing pan.
8. Press the function-key F3 "1/1" → balance will flash on.
9. Press the function-key F4 "SET" → balance will flash on and show the value for the full load.
10. Now exit the service mode by pressing the ON/OFF-key.

4.10.8 Final check of the adjustment

1. The balance must have reached its operating temperature, for that assure that balance is connected at least three hours to the mains.
2. Calibrate the balance by holding TARE-key till „CAL EXT“ appears → release TARE-key.
3. Check the corner load → see “Adjusting of the corner load” in chapter 4.10.4.
4. Check the linearity with half weight and full weight.
5. Carry out any S-corrections → see “S-correction of a balance” see chapter 4.10.9.

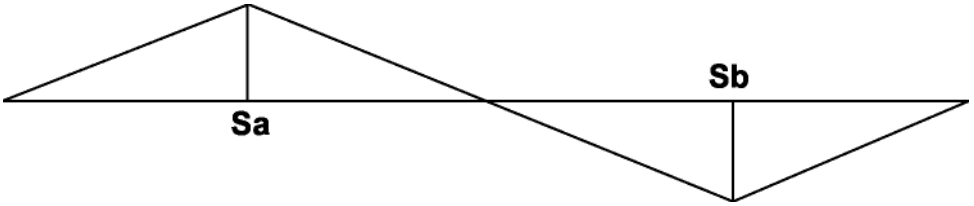
4.10.9 S-correction of a balance

4.10.9.1 General notes on S-correction

- The balance must have reached its operating temperature and must be in service mode.
- In every linearization of a balance the correction factor is deleted and must, if necessary, be redefined.

4.10.9.2 Entry of the correction factor

1. lace a weight of 1/4 full load in the centre of the weighing pan, note the difference between the actual weight and the weight indicated by the balance.
2. lace a weight of 3/4 full load in the centre of the weighing pan, note the difference between the actual weight and the weight indicated by the balance.



4.10.9.3 Calculating the correction factor

- For the correction factor the sign of the measured value must be reversed.
- For example: + 4 digits were measured →- 4 digits must be entered.
- For example: - 2 digits were measured →+ 2 digits must be entered.

4.10.9.4 Entry of the correction factor

1. Press and hold down the CHANGE-key until "SCORRECTION" appears on the Info-Display, then release the key.
2. Using the function-key F2 "SECTOR" the correction range Sa or Sb is established.
3. Using the function-key F3 "UP" and F4 "DOWN" the chosen correction factor is entered and set with the function-key F1 "SET".
4. Submit the balance to a further final check → see “Final check” in chapter 4.10.12.

4.10.10 Temperature linearization

1. The balance has to be set in service mode → see “Activation of the service mode” (chapter 4.10.1)
2. The temperature-calibration set part-no. 350-8570 (page A2) needs to be connected to the RS232 Interface, located at the back of the moisture analyzer.
3. Put the temperature sensor of the temperature-calibration set into the sample chamber.
4. Press and hold the CHANGE-key until the Info-Display shows „TEMP LINEARISATION“, release the key.
5. Press the START/STOP-key , the temperature linearization starts now. **Note:** Within the first two minutes, the room temperature will measured. After that, the moisture analyzer heats up to 100°. The display indicates the

temperature and the remaining time for the temperature linearization (the time duration to heat up to 100°C, is 20 minutes). The moisture analyzer will now adopt the temperature from temperature-calibration set. Afterwards the moisture analyzer will heat up to 200°C which takes 20 minutes to reach. As before, the moisture analyzer will again adopt the temperature from the temperature-calibration set.

6. The temperature is now linearized and the temperature-calibration set can now be disconnected. 7. Using the ON/OFF-key switch the balance off and on, the service mode is now exited.

4.10.11 Configuration of the heat source

1. The balance must be set in service mode → see “Activation of the service mode” in chapter 4.10.1.
2. Press and hold the CHANGE-key as long as in the Info-Display “HEATER CONFIG.” appears → release the key.

4.10.12 Final check

Review of the final tolerances (reproducibility, linearity and corner load).

4.11 Error Messages

4.11.1 Operating error

(Error disappears with correct use or application)

Error-No.	Error responsibility	Error repair
Error 1	Invalid program	Load right program
Error 2	Weight too small	Use higher weight
Error 4	Wrong anti-theft-code	Use right code
Error 5	Wrong anti-theft-code	Use right code
Error 8	Zero point outside range	
Error 9/0	Calibration factor bad	Repeat calibration
Error 9/1	Zero point difference too high	Repeat calibration
Error 47	Too many values	Use fewer values
Error 48	Different first unit from input	Use original unit
Error 49	Too few values	Use more values
Error 53	Values out of range +/- 50%	Use appropriate weight
Error 60	Fallen below minimum transformer area	
Error 61	Maximum transformer area exceeded	

4.11.2 Fatal error

(Balance stays still, error repair in service mode)

Error-No.	Error responsibility	Error repair
Error 10	No linearization values	Repeat linearization
Error 11	No calibration factor	Repeat calibration
Error 22	No temperature compensation values	Call service
Error 26	Missing temperature-linearization-value in moisture analyzer	Temperature linearization
Error 27	Missing temperature-calibration-value in moisture analyzer	Temperature calibration

4.11.3 Hardware error

(Balance stays still)

Error-No.	Error responsibility	Error repair
Error 14	Wrong model code	Call service
Error 16	Internal RAM destroyed	Replace CPU
Error 17	External RAM destroyed	Replace RAM
Error 18/1	Wrong program check sum	Load right program, replace FLASH
Error 18/2	No approved program build in approved balance	Load right program
Error 18/8	FLASH empty	Load right program, replace FLASH
Error 18/9	Wrong controller check sum	Replace CPU
Error 19	Wrong code figure	Load right code figure
Error 20	Temperature measurement defective	Call service
Error 28	Temperature measurement moisture analyzer defective	Call service

4.12 Discussion with the manufacturer

In discussions with the manufacturer's works the following information should be provided:

- Balance type (e.g. MRS 120-3)
- Series number e.g. 330-65 (Label on the rear of the balance)
- Program number e.g. 00,00P00 N50 (appears on the display when switching on the balance)
- As precise a description of the defect as possible
- Weighing results
- Drying settings
- Preparation of the samples